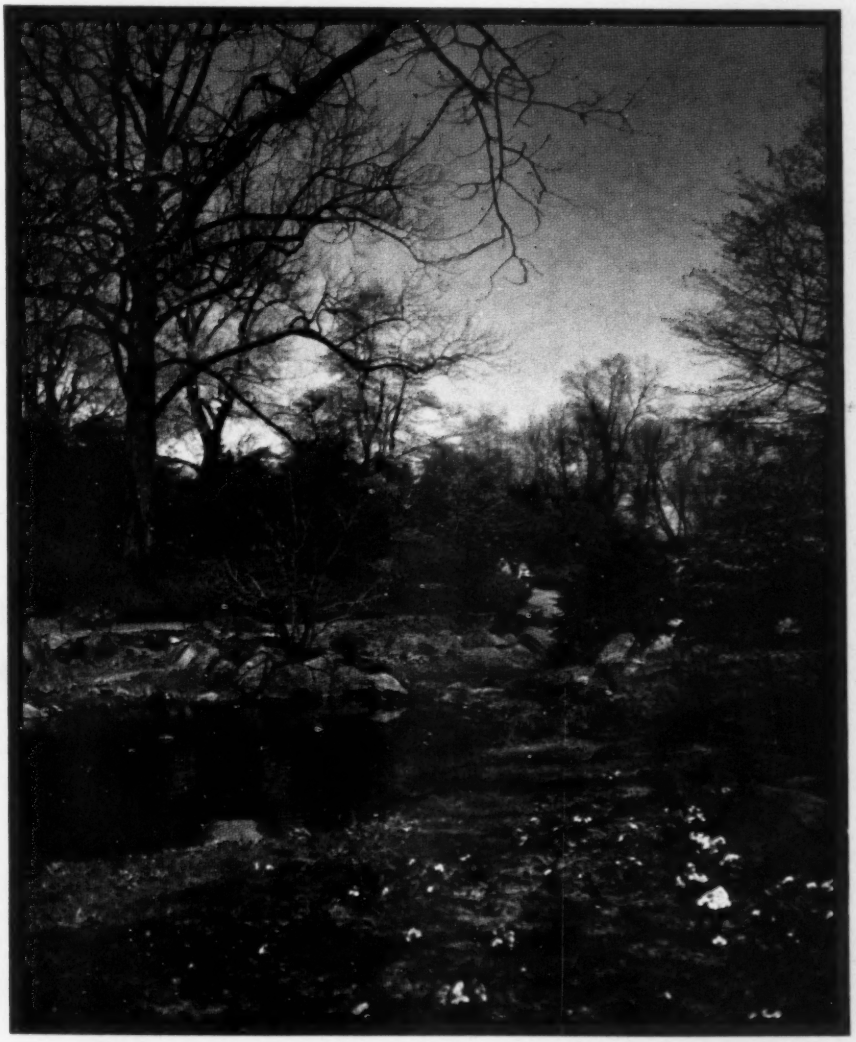
The Garden Journal

of The New York Botanical Garden



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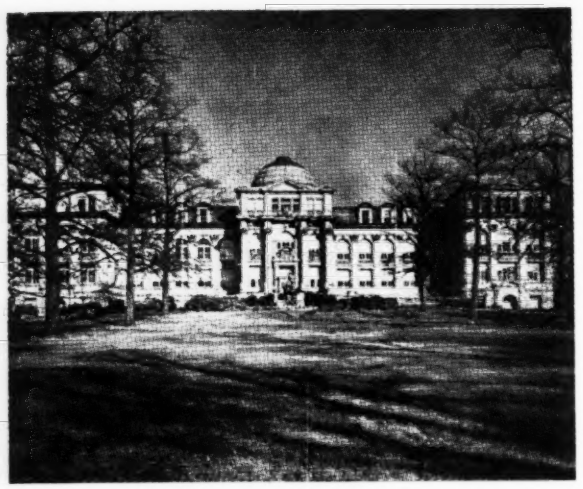

May — The Thompson Memorial Rock Garden is a charming place to visit.

June, and throughout the summer — The Rose Garden attracts thousands of visitors.

June 5 — Tenth Annual Rose-Growers' Day at The New York Botanical Garden.

DOROTHY EBEL HANSELL
Editor

RUTH V. CAVISTON
Assistant Editor

THE GARDEN JOURNAL
of The New York Botanical Garden

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CREDIT FOR ILLUSTRATIONS

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ROSES IN THE SMALL GARDEN

By **Frederic R. Webb**

FLOWER shows, with their artistically designed small rose gardens, have done much to quicken interest in the value of roses in landscaping home surroundings. The many types and variations of the rose make it the most adaptable flower for almost any conceivable decorative purpose.

From a garden standpoint, the only limitations are the available space and the time at one's disposal to give roses the care they require. No garden is so small but that some roses cannot be grown. It may be only a dozen hybrid tea roses to start with — larger garden undertakings often have their inception in a small way; a climbing rose large enough to cover the side of a garage, or other climbing kinds modestly adorning a stone wall or picket fence; some of the gay and sparkling floribundas used here and there for accent purposes; shrub roses for an informal hedge; or miniature roses for the rock garden. These are just a few of the many ways that roses can be used to make the small home surroundings more attractive. Whatever the need, a rose can always be found to suit the purpose and to give an abundance of bloom.

In speaking of roses, we usually have the hybrid tea roses in mind. They comprise by far the largest and most popular class. Being strictly a bedding rose, they require a little more thought in planting arrangement and subsequent care than other types of roses to do their best, but for this attention they reward us most abundantly. Their continuous blooming season, from June until frost; their wide range of colors, and combinations of colors; and their fragrance fully justify their popularity. When planted in an artistic manner, they often form the keystone of the garden.

If a bed of hybrid tea roses is to be planted, select a well-drained location having sun for at least half a day and sufficiently removed from conflicting tree roots. It is always advisable to make a rough draft, or plan, on paper before starting any operations.

As no two properties are precisely alike, planning the rose garden offers plenty of scope to work out individual ideas. The fundamental rules of landscaping should be kept in mind, however. Avoid scrolls and fancy designs. Simplicity should be the rule.

If the site selected is in the middle of the lawn, a circular or semi-circular design is often more attractive than a rectangular bed. Two semi-circular beds rather than one solid bed is preferable, with the center open and a pathway, or entrance, at each end of the circle. Very often a birdbath, or sundial, as a focal point in the open center space will increase the artistic effect. Give thought to proper balance of lawn area and rose bed.

Another pleasing effect is obtained by planting solid beds along the borders, or across the corners of the garden, backed by climbers or shrub roses. Such a boundary planting, besides adding privacy to the garden, also serves as a windbreak, a real asset in rose growing. Long narrow beds beside a driveway are very effective and give lengthened perspective. Bear in mind that the location and design of the rose garden should be in keeping with the immediate surroundings and form an integral and well-balanced part of it.

Planting distance of hybrid tea and floribunda roses should be, on the average, from fifteen to eighteen inches apart. With this spacing, it will be found that a bed of roses takes up comparatively little ground. In general, beds should not exceed five feet in width in order to facilitate working in and around the plants.

Dr. Debat, a rose-pink hybrid tea from Francis Heilland of France, the originator of Peace. This new rose, Plant Patent No. 961, is a seedling of Radiance.

Granted that hybrid tea roses give us almost everything we can ask for in rose quality, they still remain strictly a bedding rose and require more care than other types of roses to do well. An understanding of these other classes of roses will, perhaps, suggest ways of using them not heretofore thought of and broaden our enjoyment of roses in general.

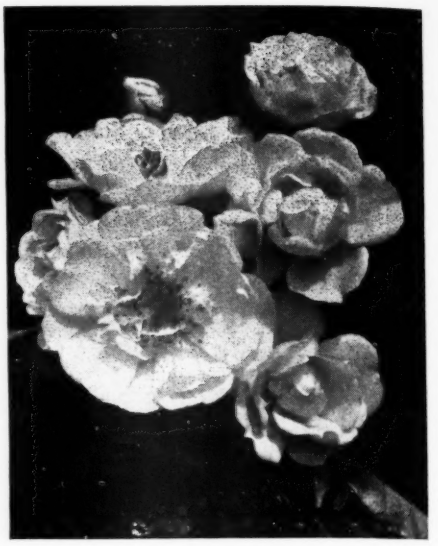
Floribunda roses are similar in habit and growth to the hybrid tea type of rose, but differ in the formation of their bloom. Instead of one or, perhaps, two or three flowers on a stem, they come in cluster formation with as many as six to fifteen in the cluster. The range of colors of these "many flowered" roses includes the whites, all shades of pink, many shades of red, scarlet and crimson, yellow and orange, and, finally, the biu colors. For gay splashes of color around the garden or home from early June until frost, no flowering plant excels in interest and charm the modern floribunda roses. Because of their colorfulness, prolific blooming habit, and carefree qualities, these versatile roses fit into any formal or informal garden design.

Their many uses include mass planting in beds by themselves, particularly where one variety is used or harmonizing colors are planted together; as a border for shrub roses or perennials; in bays against an evergreen hedge, or interspersed here and there among the evergreens for color effect; in odd corners of the garden for accent purposes; as a low-growing, blossom-laden hedge to border a walk or driveway.

If a place cannot be found for either hybrid tea or floribunda roses in the garden, this need not rule out the joy of having roses. For there are climbing roses, which require only casual attention and furnish immense quantities of flowers in the spring, and often some in summer and fall as well. Not only are the flowers of the modern climber much larger, but resistance to disease has, to a large extent, been bred into them. Given suitable support, they will readily clamber over it and, once established, remain in place for years. On the average, these roses should be planted six feet apart.

In selecting climbing roses it is important that the variety chosen be suitable for the purpose in mind. Generally speaking, the canes of the more robust climbing roses will extend to twenty feet or even more, what might be termed the semi-vigorous varieties from twelve to fifteen feet.

The more vigorous climbers are most satisfactory when used to cover a large area — grown on a trellis as a background for roses or a garden of flowers; to brighten an entrance or porch; or even to cover the side of a garage or other low building. The semi-vigorous varieties are ideal to train over a low support — an archway, an arbor, a fence or even, as I have seen them used, to trail over a large boulder.



City of York, a hardy and strong-growing white climber, the first and only climbing rose to receive the gold medal of the American Rose Society.

They are also at their best when trained as pillar roses — that is, loosely attached to a post with cross pieces, or similar upright, and allowed to trail gracefully over. Treated in this way, they make splendid accent points in the garden. Many of them furnish long-stemmed flowers in clusters, attractive as bouquets in themselves. Even out of flower they are more attractive than many vines and retain their foliage well into the winter. Climbing roses will give a lift and variety of height in the garden not easily accomplished

Miniature rose Bo-Peep growing in a strawberry jar adds charm to the steps near an entrance.

The fall blooms of this new everblooming rose, Bobbink White Climber, are especially fine.

by other means in the small garden.

Many types of roses might be included under the term "shrub roses." This would include most of the old-fashioned roses and some of their more modern progeny, the rugosa roses, and their hybrids. For the home garden they are very desirable as true specimen plants; in the background of the rose garden or mixed flower border; to hide a necessarily untidy place in the garden; or as a tall-growing informal hedge. The rugosas are particularly adaptable as hedge material and are noted for their attractive fruits in the autumn and winter. They grow to five or six feet or more in height and form an impenetrable screen. They bloom but once, usually in June and July, although some later scattered flowers may occur. They are the ultimate in hardiness and, once well planted, require little attention. They should be spaced from four to five feet apart.

At the other end of the scale, as far as height is concerned, are the miniature roses. These unique roses are not nearly as well known as they should be. They are exact facsimiles of the larger roses in every respect only on a smaller, an unbelievably smaller scale. They grow only to a height of six to eight inches, their buds are scarcely larger than kernels of corn, and open to perfectly formed flowers of thumb-nail size, not more than three quarters of an inch across. Many of them are double in form, with as many as forty to fifty petals. The dainty lace-like foliage is in keeping with the diminutive size of the plant. These miniatures are also called "fairy" roses and, indeed, there is something really fairylike about them.

Their possibilities as garden plants are almost limitless. They are ideal rock garden plants; they make a fine edging for a flower border, a pool or at the base of a garden ornament. In fact, I have even seen them growing in strawberry jars. The city dweller can create a complete rose garden in a window box. Needless to say, these delightful little roses are excellent for any artistic arrangement or personal adornment. There is quite a wide selection of colors — white, the various shades of pink, several shades of red, crimson, and scarlet, and a yellow.

The needs of roses are very simple,

Floribunda rose Pigmy Gold is a true dwarf, being less than a foot in height.

but very important to their well-being: sunshine, food, water, and freedom from disease.

With the exception of the miniature roses, which are not fertilized at all, roses require heavy fertilization. Organic fertilizers in the form of rotted stable manure (or, if not obtainable, the prepared kind), well decomposed compost, or any recognized rose food, used liberally, will suit them.

Hybrid teas and floribundas, to a certain extent, are more susceptible to disease and insect pests than other kinds and should be sprayed, or dusted, with one of the all-purpose materials obtainable at any nursery supply store. This should be applied regularly at weekly or ten-day intervals from early spring until frost, to prevent both blackspot and mildew disease, and to keep the plants free from the ravages of insects.

Watering during any protracted dry period is very important. Water the ground thoroughly, but avoid wetting the foliage. Letting the water run onto the bed with the nozzle off the hose is one simple way of accomplishing this; another, by means of the modern soil soaker or watering wand.

Rose growing affords relaxation and diversion offered by few other pursuits. In fact, there is scarcely any gardening effort which provides the same amount of pleasure and joy as does a rose garden. Over a long period of years, spent in growing and observing roses, and enjoying contact with other amateurs, I have yet to find a real rose lover who ever became bored or lost interest. The indescribable beauty of roses bursting into bloom on a bright June morning; the joy of sharing roses with others who, through circumstances, have none of their own; the fine friendships made in the ever-growing fraternity of rose growers — all these pleasures and many more, the rosarians know are the rewards of earnest and persistent endeavors.

Part of the author's rose garden at Essex Fells, N. J.

Horticultural Commentary

THE BOEHMER CATALOGS

By T. H. Everett

AN ARTICLE in "The Gardeners' Chronicle" for January 5 sent me scurrying to the uppermost shelves of our library stack room, to the "hurricane deck," as it is sometimes whimsically called. My objective? To discover what we have in the way of catalogs of L. Boehmer & Co. of Yokohama, Japan. For, in "The Gardeners' Chronicle," my old friend and editor, Charles H. Curtis, tells intriguingly of a 1903 Boehmer catalog, which he possesses. It is, he says, "a unique and beautiful production freely illustrated with the most delightful pictures, in colour, by T. Hasegawa, 'the famous art printer of Tokio.'

"Although a catalog, it is really a book of quarto size and, with the illustrations, is presented in a form characteristic of Japanese art." Mr. Curtis comments further upon "this extraordinarily beautiful book that seems to lose dignity when described as a catalog. The colouring is always softly effective and even when the artist gives rein to his sense of colour, as in the painting of a crimson-leafed Japanese Maple, he seems to be saying that people would never believe him if he depicted the vivid brilliance of which such leaves are capable. Restraint is obvious in all the lovely illustrations."

The "hurricane deck" failed to produce a 1903 catalog of L. Boehmer & Co., but it did yield an 1899-1900, a 1900-1901 issue and a wholesale edition for 1901-02. These contain forty-two, forty and forty-two numbered pages, respectively, rather than the sixty-eight reported by Mr. Curtis. The earliest dated has nineteen and the others thirty-one pages of pictures which are mostly duplicated in the various issues, in addition to cover illustrations which differ in the three books. But alas, they do not total the forty-seven different pictures that Mr. Curtis' 1903 catalog contains, nor are there included any of the "several" that "occupy two pages." But wait — on page 42 of the 1901-1902 issue is an advertisement of a book "being just published" by Mary E. Unger, titled FAVORITE FLOWERS OF JAPAN, published by the well-known art printer, T. Hasegawa of Tokyo, and written under the direction of Alfred Unger, proprietor of L. Boehmer & Co. of Yokohama. This perhaps would be helpful — but do we have it?

A hasty check of the index file reveals we do and in no time at all I am examining this most splendidly illustrated and excellently printed book of sixty-three pages. It is, I observe, of the same size and format as the Boehmer catalogs. In the preface it is pointed out that the writer has made "frequent excursions to many a famous park and garden in the company of her husband and friends." It is further stated that "Her husband during a twelve years' business in Japan has made a special study of these subjects." There is little doubt then that Mary E. Unger was the wife of Alfred Unger, proprietor of L. Boehmer & Co.

And here in Mary's book we find some fine plates described by Mr. Curtis. Here are "Japanese Iris by the water's edge," "pink peonies and people inspecting a peony exhibition," "sprays of cherry and plum blossoms," and "the dainty pink of the cherry blossoms hanging cloud-like over a group of farm houses, one of the loveliest blossom effects imaginable," as well as "Nelumbiums rising over the waters of a mountain lake and faintly dimmed by the mists of the morning," "the cluster of Camellias," the morning glories of "airy grace," the "Wisteria," the "Nerines," "the branch of persimmon fruits," "chrysanthemums" and "the Cymbidiums." Some of these are the double page illustrations described by Mr. Curtis but, unfortunately, not all are here. Missing is "a gardener in Japanese costume, seated under the shade of a Chusan Palm with, in front, two baskets of Lily bulbs — evidently waiting for a customer." It is the only one mentioned by Mr. Curtis that I did not find in our New York Botanical Garden library; perhaps there are others, however, for Mr. Curtis does not list all he has in his Boehmer catalog and Mary Unger's book contains many

choice ones he does not mention, colorful fruits and heavenly bamboo, cycas, dwarf trees, dish gardens, evergreens, hydrangeas, daylilies, lilies, magnolias and azaleas, garden scenes, an extraordinarily simple and beautiful depiction of regular bamboo and its young shoots, and others — a choice collection sympathetically drafted and reproduced in colors of rare clarity.

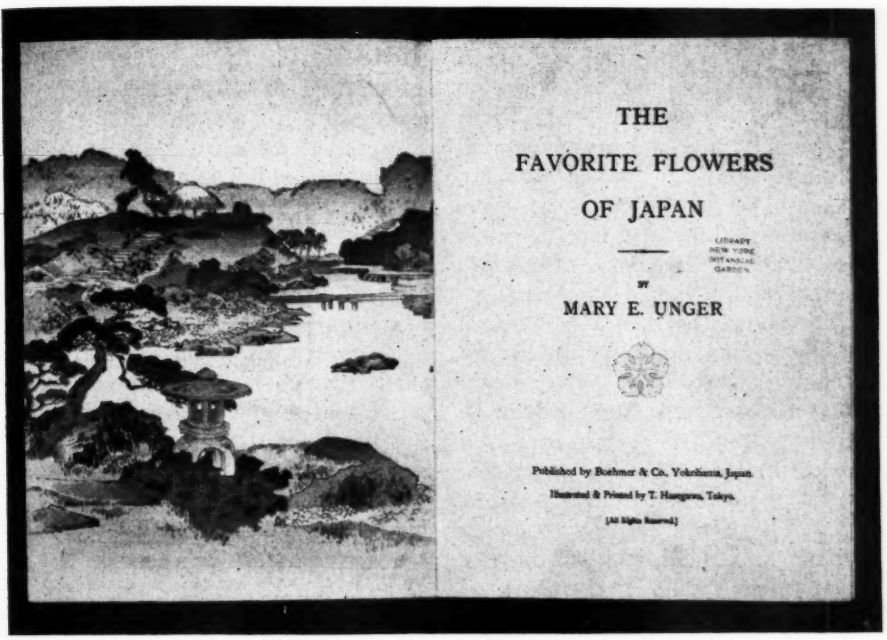
But who was Alfred Unger and how came he to be proprietor of Boehmer & Co., nurserymen of Yokohama, Japan? And who was Boehmer who gave name to this nursery, established a report to him. Boehmer's death is reported as occurring "recently" in Germany in "The Gardeners' Chronicle" dated October 24, 1896.

Alfred Unger died on December 5, 1938, aged seventy-three years. According to an obituary which appeared in "The Gardeners' Chronicle" on January 14, 1939, he had "for many years been living at Heidelberg; but in his youth, after a thorough grounding in horticulture with the export firm of G. C. Schmidt and elsewhere, he went on behalf of that firm to Yokohama, where Louis Boehmer was established in business exporting Japanese plants. Unger went into partnership with Boehmer and remained in Japan about twenty years, gaining an unrivalled knowledge of the conditions of plant exporting from that country."

Some final comments should be recorded about the catalogs of L. Boehmer & Co. filed in the library of The New York Botanical Garden. In addition to those mentioned, we have wholesale issues for 1904-05, 1907-08, and 1910, and a retail catalog for 1911 — but all of these are of European style, make-up and printing and are illustrated by rather poor halftone plates; they possess none of the beauty of the lovely Japanese style productions of 1899-1900, 1900-1901, 1901-1902 and 1903.

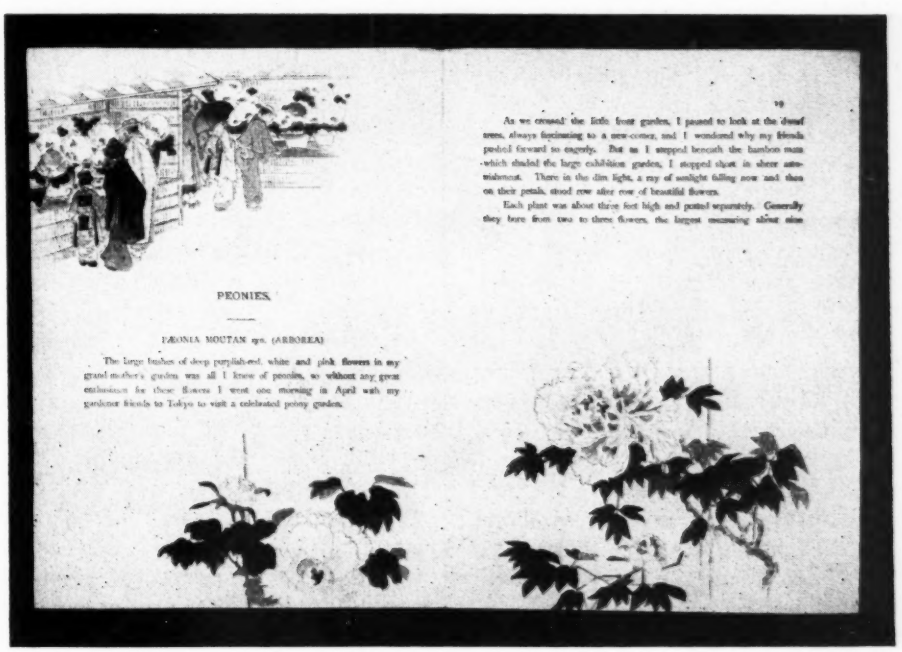
Lacking artistic significance, too, is an 1896-1897 edition that includes twenty-nine rather gaudy colored plates of lilies and fritillarias, one hand painted plate of a daylily and twenty-five numbered pages of text.

Apparently the heydey of superb catalog production by L. Boehmer & Co. was 1899-1900 (or possibly 1898-99) to 1903 inclusive. These years, except 1898-99, are represented in the possessions of The New York Botanical Garden and of Charles E. Curtis.



Frontispiece, opening page and spread from the book, "Favorite Flowers of Japan."

in 1882, and in 1902 "The only European Nursery Firm in Japan"? A little further library research yielded answers to these questions. Answering the last question first, Louis Boehmer who established the firm of L. Boehmer & Co. was a German who in 1876, and seemingly for some time previously, was horticulturist to the Kaitakuska, Hedo, Japan. In 1876 there appeared in Meehan's "Gardeners Monthly and Horticulturist" a "paper kindly communicated to us by Mr. Louis Boehmer, an excellent gardener and botanist." This paper deals with botanical exploration of the Island ordered by General Horace Capron, chief agricultural adviser to the Emperor of Japan, and is in the form of


PEONIES.
PÆONIA MOUTAN syn. (ARBOREA)
The large bushes of deep purplish-red, white and pink flowers in my grand mother's garden was all I knew of peonies, so without any great enthusiasm for these flowers I went one morning in April with my gardener friends to Tokyo to visit a celebrated peony garden.
As we crossed the little front garden, I paused to look at the dwarf trees, always fascinating to a new-comer, and I wondered why my friends pushed forward so eagerly. But as I stepped beneath the bamboo mats which shaded the large exhibition garden, I stopped short in sheer astonishment. There in the dim light, a ray of sunlight falling now and then on their petals, stood row after row of beautiful flowers.
Each plant was about three feet high and potted separately. Generally they bore from two to three flowers, the largest measuring about nine

A BOTANIST

In Your Grocery Store

PART I

By **Richard A. Howard**

For the curious there are many sources of botanical information — a drop of water under a microscope; a pond in the backyard; a distant island or a foreign land; the public library or even the corner grocery store. The different articles found on the counters in your grocer's store come from many lands, represent years of work by plant collectors and plant breeders, and represent nearly all parts of the plant kingdom and morphologically all portions of the plant body. Mixtures of the plants and the plant products useful to man are found on the canned goods shelves, and due to the requirements of the Pure Food and Drug laws, all of these are named. Many of these labels make interesting reading, for a bottle of Worcestershire sauce or root beer extract may list as many as fifteen different plants or plant products contained in the formula. Botanizing is excellent in a grocery store and the time spent considering the produce or reading labels can be educational. For this botanist, the week-end shopping spree is almost as good as a field trip.

Last week I visited a large supermarket looking for botanical information. Using the broad perspective of an economic botanist, I was able first to group all plants represented in the grocery store into three categories: 1. necessities, 2. ameliorants, and 3. industrial. Then I looked at these same products from the point of view of the plant kingdom and discovered many divisions and families represented. Next I considered what type of product of the plant was used and found carbohydrates, fats, proteins, vitamins, enzymes, and other by-products. Finally I considered the part of the plant that was utilized — flowers, leaves, seeds, etc. I was able to ignore the price tags for one short period while enjoying a botanical foray.

To a botanist the botanical necessities of life are food, the plant products used for shelter and fuel, and fibers. Most of the plant materials found in the store were items of food. Fresh and canned fruits and vegetables fall into this category. Shelter was not considered by my big city super-market, although fuel as a category was represented by bundles of fireplace wood, specially bagged chips of hickory for outdoor grills, and charcoal, partially burned wood, for the luxury of cooking a special meal. The canned fuel for cigarette lighters might be considered here, since this fuel is a petroleum product distilled from coal or oil, both of which are of plant origin. The fibers, of course, were more abundant. The stems of the flax plant produce the fibers of linen used in the dish towels for sale, and hairs from the seeds of the cotton plant were woven into cotton towels and dish cloths. The branches of the inflorescence of the broomcorn, a variety of sorghum, were used in the bristles of brooms and brushes and were probably grown in the Mississippi basin in the United States. Not exactly fibrous in origin but certainly abundant in the store were the corks in various bottles. Cork is obtained from the bark of certain types of trees, primarily oaks. These dead cells with hollow cell cavities and walls impregnated with water-repellent waxes are light, spongy, tasteless and almost impermeable to air, and serve well as stoppers for bottles of liquid.

The second category of useful plants, that of ameliorants, includes those plants and plant products not essential to our lives but which by their use make our lives a bit more pleasant. Here the botanist finds spices and perfumes, stimulants and medicinals.

The value and variety of spices in our daily lives have been well described by Bernard L. Lewis in the November-December 1951 issue of The Garden Journal. Mr. Lewis points out that spices are almost necessary items in our diet and that their proper usage certainly improves the appeal and value of our foods. We find spices in the grocery store as dry spices or in solution as extracts and flavorings. A bottle of chili sauce contains tomatoes plus peppers, onions, garlic and spices such as mustard seed, coriander, bay and black and white pepper. According to the label, a bottle of piccalili relish contains mustard seed, coriander, allspice, ginger, chillies, cloves and mace in addition to both black and white pepper. A bottle of Worcestershire sauce contains, according to information on the label, soybeans, turmeric, tamarind and sage in addition to the more common seasonings.

Spices can represent any part of the plant. Bay, chervil, sage and marjoram are whole or powdered leaves. Cloves are the flower buds and black pepper the entire fruit of the pepper vine, while white pepper is only the seed of the same plant. The spice annatto is the powdery material on the seed coat of a handsome tropical tree and tamarind is the pulp around the seeds of a member of the legume family. Nutmeg is the seed of a tropical tree; growing around these seeds is a red, fleshy, fibrous mass which is the mace of commerce. Thus nutmeg and mace are two spices obtained from one tree. Turmeric is obtained from the roots of a member of the ginger family and cinnamon is the bark of a member of the laurel family. The orchid family yields one spice or flavoring for us, vanilla, which is extracted from the ripe pods of a viny orchid plant.

Spices when used as flavorings may come in a weak watery solution, or, as in the case of vanilla, an alcoholic extract. Vanilla extract is usually about 37% alcohol, but some of the other flavorings, like lemon or orange, require alcoholic concentrations as high as 84% to maintain the flavor in storage.

Plant products used as perfumes are

more abundant in the grocery store than most of us realize. The aromatic properties of the chemicals found in plants make them perfumes, and these are sometimes called essential oils as they are volatile and will evaporate completely. Perfumes are easily recognized in soaps and talcum powders found in the grocery store, but they are also used in shoe polishes, tooth pastes, tobaccos, and processed cheeses and margarines to impart a country aroma to the product.

There are few Americans who do not use a daily ration of stimulant to improve their well-being. Most of us take such stimulants as caffeine in coffee or tea or alkaloids from tobacco. Coffee, tea, cocoa, the carbonated beverages, and the less common maté can all be bought in the super-market. The caffeine in all of these beverages serves as a stimulant to wake us up in the morning or relieve that tired feeling in the middle of the day. The cola-type beverages have caffeine from cola nuts. Many of the sarsaparilla or ginger beverages are also mild stimulants through the use of these or other plant products.

Fermented beverages are stimulants due to the alcohol they contain. Alcohol is formed by the action of yeast, a fungus, on starches and sugars to produce beer and ale, while in the process molasses and hops may be added for flavor. Wines and some of the stronger liquors depend on yeast fermentation of fruit sugars for their special flavors. The true liqueurs or cordials depend even more upon plant products for their special flavors. Anisette contains coriander and anise; kümmel has caraway; crème de menthe has peppermint; crème de cacao has cocoa; and crème de noyau has bitter almonds for flavoring. Curaçao is distilled from the dried rind of bitter oranges steeped in alcohol and water, while maraschino is distilled from bruised marasca cherries.

Tobacco has been called a narcotic, but it is more properly considered a stimulant since it produces no effect on the consciousness of the user. The alkaloids found in the tobacco leaves have a slightly stimulating effect on the user of tobacco, but in general the use of tobacco can be considered a manual and oral habit. Most of the tobacco in American cigarettes is obtained from a special strain of tobacco plant bred so that there is very little nicotine left in the leaves. The flavors of various cigarettes or pipe mixtures of tobacco depend on the curing process of the tobacco leaves as well as the blend of leaves grown in different areas of the world under different climatic conditions. Thus a specialist in tobaccos can easily recognize the area of origin of the blended tobaccos from their aroma when burned. In addition to the blends of tobacco used, rum, molasses, sugar, honey and menthol are added to flavor the smoking tobaccos.

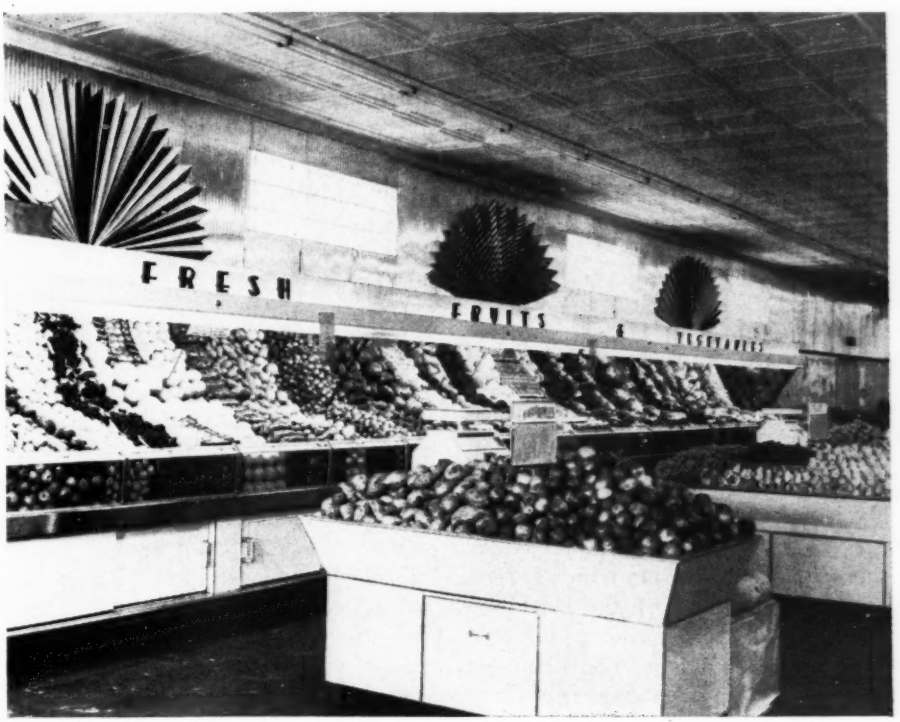
There is also a botanical story in the cigarette paper surrounding the tobacco. The majority of this paper, in prepared cigarettes, is made from fibers of hemp, linen or jute. It is considered a fine grade of paper and is produced in North Carolina primarily. The packets of paper one can buy in the grocery store to roll one's own cigarettes, however, are made in France. Generally these papers consist of the same botanical fibers but are a coarser and stronger grade of paper.

On the candy counter or the shelf of medicinals are the products of many herbs still used for their medicinal values or for flavoring. The essential oils obtained from the leaves or flowers of wintergreen, peppermint, teaberry, hoarhound or cloves are used both medicinally and for flavoring. The cinnamon used in flavorings of candy and gum comes from the extract of the bark, while anise, commonly used medicinally, is obtained from the roots of a member of the legume family.

When a botanist looks in the grocery store for industrial uses of plants, he finds manufactured products where plant derivatives are used as tannins and dyes, fatty oils and waxes, rubber products and even processed wood articles. Most of the tannins used industrially are extracted from the bark of trees and less frequently from wood chips. Tannins are used extensively in preparing leather, but a few modern shoe polishes now contain tannins from such trees as hemlock, mangrove or oak to renew the color of scuffed shoes and to help preserve broken leather surfaces. Of course, the shoe polishes also contain dyes and waxes to give added color and polish.

A few dyes from plants are used in inks. The most popular ink today is the blue-black ink, the dye for which is extracted from galls formed on the

(Continued on page 83)



Open refrigerated display cases preserve quality and freshness of perishables, attractively arranged in produce department of modern A & P Super Market, at Woburn, Mass.

SOIL MANAGEMENT IN GARDENS

Part II

By **Charles E. Kellogg**

NEITHER TOO ACID NOR TOO ALKALINE

Most soils in the eastern part of the United States are naturally somewhat too acid for lawns, vegetables, and the majority of flowers and shrubs. In acid soils many of the plant nutrients are not as easily available to plants as in neutral soils. Then, too, many of the micro-organisms that decompose organic matter and that make nitrogen available to plants grow poorly in acid soils.

In discussing soil acidity, most writers use a notation called pH. A perfectly neutral soil has a pH of 7. Higher values indicate alkalinity, and most soils above pH 8.4 are too alkaline for good gardens. Values below 7 indicate acidity. For the great majority of garden plants, a soil pH between 6 and 7, and more precisely one of 6.5, is ideal. Soils that are *naturally* more alkaline than this, say between pH 7 and 8, are satisfactory for gardens, but one should not lime an acid soil to a pH greater than 7 and it is better to stop at 6.5. Several good test kits are on the market that the ordinary gardener can use to test his soil, both the surface soil and the lower layers, in order to discover the pH.

Plants vary. Although a soil pH of about 6.5, or very slightly acid, is ideal for most garden plants, there are several highly important exceptions. Some like it more acid. Somewhere between pH 4.6 and 5.2 is ideal for azaleas, rhododendrons, mountain laurel, blueberries, and many of the flowering plants and shrubs native to the acid soils of humid regions. Thus, suppose a gardener along the eastern coast of the United States finds that he has a rather sandy acid soil in shade; if he decides to grow roses, he shall need to remove the trees, add lime to the soil, and mix clay with it; but such a site may be ideal for azaleas, mountain laurel, and rhododendrons just the way it is. These acid-loving plants won't grow well in garden soil that is ideal for vegetables.

Amounts of lime to use. Acid soils are made more nearly neutral by adding lime. A wide variety of liming materials may be used to reduce soil acidity including burned lime, hydrated lime, oyster shells, marl, and ground limestone. The first two react most quickly but are the most expensive and the most difficult to use. Unless spread very evenly, one may get an excess of lime in some spots with bad effects on plant nutrition. By far the best material to use is ground *dolomitic* limestone. This is best for two reasons: it contains magnesium, which is deficient in most acid soils; and it becomes nearly insoluble above pH 7 with little danger of overliming if one does put on more than necessary.

A rough recommendation for acid soil of medium texture, for the general garden, is one hundred pounds of finely ground limestone per one thousand square feet for each seven-inch layer of soil. On sandy soils, the amount should be less and on very clayey ones, a bit more. The following table suggests general recommendations of the pounds of finely ground limestone per one thousand square feet needed to raise the pH of a seven-inch layer of soil one unit of pH:

	pH 4.5 to 5.5	pH 5.5 to 6.5
Northern states		
Sandy loams	25	35
Loams	40	50
Clay loams	80	100
Southern states		
Sandy loams	45	55
Loams	60	85
Clay loams	100	120

One would use only about half as much burned lime and three-quarters as much slack (hydrated) lime. If the soils are unusually low in organic matter, the recommendations are reduced twenty-five percent; and if unusually high, increased twenty-five percent. It is best not to try to change the soil more than one pH unit at a time.

Soils naturally high in pH may be made acid for growing the acid-loving plants by applying ordinary sulphur at rates varying from about one-half pound to seven pounds per one hundred square feet, depending on texture and soil pH. The higher the pH and the more clayey the soil, the higher the amount of sulphur needed. Ordinarily, it is impracticable to try to make an acid soil suitable for azaleas or rhododendrons from soil already having a pH much above 6.5. It is better to remove the soil to some eighteen inches and replace it with naturally acid soil. Some use aluminum sulphate to make the soil acid—I do not recommend it.

PLANT NUTRIENTS

Most gardeners find the careful study of plant nutrients very rewarding. This subject is so big I can say only a little about it here. Of the fifteen

elements known to be required for plant growth, the soil furnishes phosphorus, potassium, nitrogen, calcium, magnesium, and sulphur in relatively large amounts; and iron, boron, manganese, zinc, copper and molybdenum in small amounts. The first three of these are commonly deficient and can be supplied most economically in chemical fertilizers. Calcium and magnesium are usually added in dolomitic limestone just referred to. Yet any of these essential elements may limit plant growth. I have seen garden soils, at least somewhere in the world, that need fertilizers with one or more of all the nutrients in the list.

For vegetables and ordinary flowers, the gardener can do fairly well by using heavy applications of farm manure along with superphosphate and a little extra nitrogen; or he can use good compost along with a mixed fertilizer, say a 5-10-5, at around fifty pounds per one thousand square feet. (The formula 5-10-5 means five percent nitrogen, ten percent available phosphoric acid, and five percent water soluble potash.)

After being sure that the soil pH is correct, it is generally best to fertilize the soil to a reasonably high level of phosphorus and potassium and to a moderate level of nitrogen. Some gardeners apply too much nitrogen in relation to the other elements, which develops quick-growing spindly plants and a low proportion of fruits and flowers. If a good quality compost or manure is used fairly abundantly, there is not much hazard of deficiencies of the minor nutrients.

Such blanket recommendations do not fit many individual plants and soils. To enjoy success, each gardener must learn to appraise the nutrient supply of his soil and supply the elements needed by the plants to be grown. Soil tests, handbooks, and lists of plants are available for making such studies. Several of the state agricultural experiment stations publish recommendations for the soils in their states. United States Department of Agriculture Leaflet No. 307 tells the gardener how to convert recommendations in pounds per acre or per thousand square feet into pints, cups, tablespoons, or teaspoons of various materials per ten feet of row or per plant. It also gives recipes for compost.

Organic Matter Versus Chemicals

Unfortunately, many gardeners have the notion that there are two sharply-divided schools of thought about fertilizing the garden soil—one that advocates only chemicals and another that advocates only organic matter. Some gardeners do fall into these extreme categories, but very few. Organic matter has many important roles in the ordinary garden. Probably we may learn to obtain some of the effects by mechanical means or with chemicals. I am not sure. But certainly substitutes for organic matter to improve soil structure and to protect the surface would be exceedingly expensive. Further, decomposing organic matter, such as compost made from healthy plants, gives a slow, continuous, and balanced supply of plant nutrients, including the trace elements, *provided* the major deficiencies have been corrected with chemical fertilizers. Certainly the nitrogen or potassium that a plant gets from chemical fertilizers is no different from that which it gets from organic matter.

On the other hand, few gardeners can depend wholly upon chemical fertilizers. These increase the nutrient supply but organic matter is needed to maintain the structure of the deep rooting zone. Plant roots require moisture and air fully as much as nitrogen, phosphorus, and the other nutrients. It is a comparatively simple matter to add fertilizers. It is commonly more difficult to develop and maintain a deep rooting zone.

Thus, nearly all successful home gardeners use a combination of organic matter and chemical fertilizers to maintain their garden soils in good condition. Animal manure of good quality is scarce and becoming scarcer. Most gardeners have learned to use compost. This is easily made by piling up several six- to eight-inch layers of autumn leaves, straw, and other plant waste, separated by one-half inch layers of garden soil. With it they mix a bit of superphosphate and nitrogen. Some make a fetish out of compost, which is silly. Some gardeners use mulches of peat moss. These are all right but usually very expensive. Ordinary sawdust serves as well and can be had almost for the asking. I use a lot of it. If it is mixed with garden soil, one should add about one cupful of ammonium sulphate or sodium nitrate, evenly spread, with each bushel.

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A simple rick for composting autumn leaves with garden soil.

Ferns are my Hobby

By **Charles E. Mohr**

In the crevices of the many limestone cobbles, the botanist finds a treasurehouse of wild flowers and ferns. The wandering leaf, spleenwort maidenhair, the common maidenhair and many other rather rare ferns glow profusely at Bartholomew's Cobble.

FERNS are my favorite plants. Though my outdoor interests began with birds, and still are primarily in the field of wildlife, the so-called "lower" plants have always held a peculiar fascination for me. Among the non-flowering plants, ferns have much to offer the nature hobbyist. They are found nearly everywhere, their beauty of form compensates for their lack of gay color, and there are not *too many* of them.

Many an amateur naturalist shudders at the size of GRAY'S MANUAL OF BOTANY, and the obvious impossibility of ever seeing, much less identifying, even a minute fraction of the flowering plants described in it. Yet in just a few years most persons could become reasonably expert on ferns. There are quite a few gardens where one can see in an acre or less, ninety percent of all the species of ferns of the northeastern United States.

I set out to build a fern garden nearly twenty-five years ago, while still a student in college. The site I selected was in a Boy Scout Camp in southeastern Pennsylvania where half a dozen years earlier I had abruptly discovered that ferns were lovely, graceful plants.

As nature counselor I helped plan and construct a nature trail, just a year or two after Entomologist Frank Lutz established his pioneer nature trail at Bear Mountain Park. At one point my trail crossed a tiny glen where a little stream flowed from a low, red sandstone springhouse into an old mill pond which was located about fifty yards away from the house.

The upper end of the streamside area formed a glen about thirty feet wide and fifty feet long. The higher embankment, on the right, rose about six feet above the stream. Along this wooded slope grew Christmas and marginal shield ferns, and a bit of polypody on the rocks, and by the brook were several clumps of interrupted ferns. With the thought that a labelled collection of living ferns would add to the interest of the trail, I began to bring in ferns from other parts of the campsite.

We dug for hours before we were able to excavate the tremendous underground stem and "roots" of several big cinnamon ferns. In the stream we built an island for a clump of royal fern. Silvery spleenwort, lady and sensitive ferns went in along the streamside, wood ferns and the graceful maidenhair on the shadier slope.

Broad beech I planted with the Christmas ferns, a combination I have always enjoyed looking at. Lime-loving, bulblet bladder fern I innocently planted among the crevices of the sandstone springhouse. It failed to establish itself, but generally the moisture and shade of the glen met the needs of the transplanted ferns.

When all of the species of the neighborhood were represented in the planting, ferns from other parts of the state were brought back from pre-camping expeditions. Ostrich ferns came from alluvial deposits along the Susquehanna; Goldie's fern and Braun's holly fern from recently lumbered forests in northern Pennsylvania. Climbing fern was rescued from culm banks on the edge of Hazelton, a site now obliterated. Gone, too, is the meadow near Allentown where I dug up adder's tongue for my fernery.

I had learned more about the soil requirements of certain ferns, so brought in limestone rocks for my little colony of walking ferns, purple cliff brake and wall rue. To keep some of these and the holly fern moist, I piped water from a pond on a higher level and created a small cascade.

During my last summer at camp, 1930, there were forty-four species of ferns growing in the little glen and it

Broad beech-fern, *Phegopteris hexagonoptera*, along the Edgar T. Wherry Fern Trail, Bowman's Hill, New Hope, Pa.

was truly the feature of the camp nature trail. The following winter the campsite was sold by the Boy Scouts and the property was closed to the public.

My interest in ferns flickered temporarily but at numerous intervals it has been fanned again to a stronger flame than before. Traveling north on our honeymoon, my bride and I stopped at Long Trail Lodge, Sherburne Pass, Vermont, to see our near-neighbors from Hawk Mountain Sanctuary, the Maurice Brouns, and earned an unexpected dividend — a conducted tour of the glorious bog and fern garden he had built with his own hands. Here I saw my first green spleenwort.

Few places we have ever visited in search of ferns have had the enchanting atmosphere of Bartholomew's Cobble, in the southwest corner of Massachusetts. Here the lime-loving ferns occur in breath-taking abundance, and some years one can see several plants of the rare hybrid, Scott's spleenwort. Its parent plants, walking fern and ebony spleenwort, both are common here.

For the beginner in fern study, the labelled fern trail at the Bowman's Hill State Wildflower Preserve, near New Hope, Pennsylvania, is especially helpful as well as beautiful. It was developed by and named for Dr. Edgar T. Wherry, whose GUIDE TO EASTERN FERNS I have found most useful. The many hours I have spent in the field with the author have naturally helped to deepen my interest in ferns.

In Florida, seeking out caves in search of bats, salamanders, and other cave fauna, I was fortunate enough to have the St. John brothers lead me through the celebrated Pineola lime sinks. Here on a cavern ledge twenty feet below the surface, I saw the only plants of *Asplenium plenum* on the North American continent. This tropical fern occurred more widely in Florida in an earlier, warmer, geological period. It has managed to survive in the Pineola Grotto because the nearly uniform cave temperature protects it from freezing. Sunlight reaches it for only an hour or so a day.

To me, one of the most remarkable spots for ferns is Fort Marion, in St. Augustine, Florida. Built of coquina, a lime-cemented, seashell conglomerate, the walls of the fort provide a man-made cliff upon which many semi-tropical ferns have become established. An exotic Japanese holly fern is the most striking of the impressive collection, southern maidenhair the most abundant.

Anyone who has witnessed the amazing resurgence of a seemingly dried up, dead fern after a rain will always remember the southern polypody, or resurrection fern. I was

This clump of resurrection fern, *Polypodium polypodioides*, attached to the loosened bark of a dead tree, was found five years ago in the Mississippi Delta by Dr. Paul Bartsch and transferred to Fern Valley, the fern sanctuary at Lebanon, his home in Lorton, Va.

astonished recently to see a luxuriant growth of this resurrection fern, not in the far south, but near Mt. Vernon, within twenty-five miles of Washington, D. C. It is one of the features of a fabulous fern garden developed by Dr. Paul Bartsch, retired curator of mollusks at the U. S. National Museum. Dr. Bartsch had found a patch of the resurrection fern growing on a great slab of bark, dangling from a dead tree. Bringing the slab north with him, he nailed it to the horizontal limb of a tree in his fernery. It has done so well that its spores have established a colony on a nearby tree.

In the short space of five years this indefatigable naturalist has established every native fern that grows north of Florida, except the curly grass fern of the New Jersey bogs. Most species are represented by dozens or scores of plants. To provide a suitable site for lime-loving ferns, Dr. Bartsch brought in four tons of limestone from the Shenandoah Valley. Part was crushed, and the rest built into a wall around it. The speed with which the walking fern spread over it is astonishing.

An extensive collection of pitcher plants, orchids, azaleas, and rhododendrons supplements the fern plantings. The "secret" of this extremely successful wild garden is the constant water supply, which is piped from a dam built at the head of the wooded ravine in which the planting has been done.

Water and shade also are the key factors in the maintenance of the most exquisite of fern gardens I have seen — a 20 x 30 foot "picture garden," built by Boughton Cobb on a limestone ledge in his backyard in Falls Village, Connecticut. Enclosed on three sides by a low stone wall, and shaded by a vine-covered trellis, the sloping fern-covered ledge receives a constant drip of water across its whole length. Tiny pools and miniature water courses are edged with small clumps or individual specimens of rare ferns. It is hard to believe but virtually every fern of the northeastern states can be found in the almost "make-believe" setting.

Many times I've thought of my youthful fern gardening venture and wondered what remained of it. Recently, I learned that the property had been bought by a Philadelphia boy's club and again was a campsite. So in mid-September I revisited the camp.

On all sides I saw the blighting results of heavy use. As I approached the fern glen, I saw that the clearing of underbrush and some trees had exposed part of the area to the sun and the trampling of many feet had denuded the lower edge of the fernery. The collapse of the pipeline had doomed the Braun's holly fern and most of the rock ferns, and a spreading mat of colt's foot and Japanese honeysuckle was making serious inroads among the wood ferns. The little royal fern island had washed away.

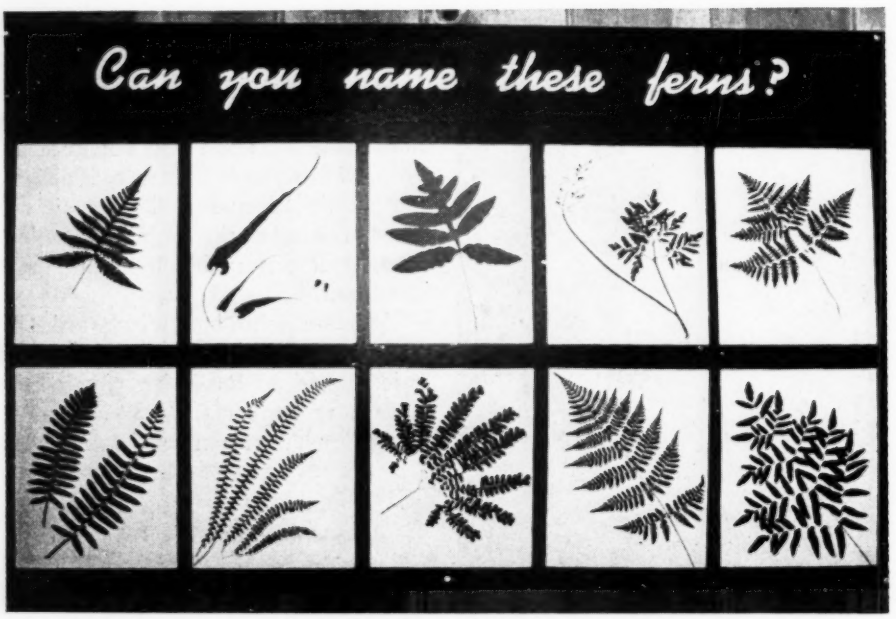
Yet exactly half of the forty-four kinds of ferns had survived twenty years of neglect. The record is of some value in suggesting which ferns offer the greatest promise when transplanted. The four best included three that had already been on the site: Christmas, marginal shield, and polypody. A mat of polypody which I established on top of the springhouse had done very well. So have the broad beech ferns which I had planted with the Christmas ferns.

Nearly as good were these: silvery spleenwort, ostrich, Clinton's, maidenhair, lady, cinnamon, sensitive and spinulose wood fern.

Goldie's, rattlesnake, and ebony spleenwort, and a small stand of *Lycopodium obscurum dendroideum* were in fair shape, while the following were barely surviving: maidenhair spleenwort, interrupted, net-veined chain, bulblet bladder, marsh, and New York ferns and bracken. The last two suffered most from trampling.

Here at the Audubon Center I have been pleased to observe how widespread among our visitors and students is the interest in ferns. Not all of the thirty-five species of ferns which grow on the Sanctuary can be found along trails, but we generally are able to direct persons to the exact spots where some of the unusual varieties grow.

In every session during our Audubon Camp of Connecticut, conducted at Greenwich each summer, are teachers and hobbyists who want to learn the ferns. To supplement their experience with ferns in the field, we have built up a collection of pressed ferns which may be used in making "driprints" (or ozalid prints). These remarkably clear and attractive prints can be made in a few minutes. An 8 x 10 print costs about one cent — a "complete" collection can be made for half a dollar, taking a person well on his way to becoming reasonably "expert" in one field of botany — a familiarity with *nearly all the local species* of one of our major plant groups — the graceful, fanciful ferns.



Fern driprints on display in the Trailside Museum, Audubon Center, Greenwich, Conn.

Yellow bear-poppy *(Arctomecon californica)* on white "gumbo" clay flats near Las Vegas, Nevada

The Bear-Poppies

By **Rupert C. Barneby**

White bear-poppy *(Arctomecon Merriami)* on limestone gravel in the Skull Mountains, southern Nevada.

Few gardens are without some sort of poppy, flowers known everywhere and valued for the beauty and brilliance of their fragile flowers. The family is a large one, including such diverse types as the bloodroot, that lovely and evanescent woodlander, the California poppies of the Pacific States, widely grown as annuals, the Asiatic plume-poppies *(Macleaya)* so ornamental in the border, and, of course, the true poppies *(Papaver)*, abundant weeds of European grainfields. But even if we include the spectacular blue poppies of the genus *Meconopsis*, now extensively cultivated in the moister parts of Great Britain, no member of the family can surpass in interest the three bear-poppies of our southwestern deserts, illustrated in their natural surroundings by the accompanying photographs.

The genus *Arctomecon*, of which bear-poppy is a literal translation, was described from indifferent specimens collected by John C. Frémont during his second western reconnaissance in 1848. It was so named in allusion to the shaggy coat of lustrous, silken hairs which clothes the leaves, and has proved most appropriate to the two species subsequently discovered. Frémont's bear-poppy, unfortunately named *A. californica* in misunderstanding of its precise place of origin, is the largest species and, perhaps, the most striking. It is a perennial plant, with a deeply penetrating taproot, but of rapid growth and probably not of many years' duration. The wedge- or narrowly fan-shaped leaves, toothed at the apex and of a remarkable blue-gray color, are mostly gathered into loose rosettes near the ground, forming low mounds or tufts of foliage. From these arise in spring several stiff, almost leafless stems up to two feet tall — in contrast with the leaves nearly devoid of hairs, but covered with a delicate glaucous bloom — which branch above the middle into a loose cluster of up to twenty nodding buds. In due course the flower-stalks uncurl, a few at a time over a period of two weeks or so, and the petals, usually five or six in number, burst forth from the enveloping calyx like a silk handkerchief which has been crumpled in the fist. They are of a clear golden-yellow and, when fully expanded, form a shallow cup about two inches in diameter, in which is balanced a thick tassel of golden stamens. The flowers are succeeded by urn-shaped capsules containing numerous large, black, thick-coated seeds.

The yellow bear-poppy was first found near Las Vegas in southern Nevada and is apparently confined to the immediate region. It is best known from a few barren clay flats at the foot of the Charleston Mountains, and it may extend around that range along the Amargosa River into California. Otherwise it is reported from one station, in northern Arizona, near the head of Lake Mead on the Colorado River. It is thus one of the rarest of western plants. In years of adequate rainfall, it can be seen with no inconvenience whatsoever in the suburbs of Las Vegas, but the rapid growth of the city in recent years is encroaching on its habitat. As known to the writer, it occurs only on white "gumbo" soils, a fine clay derived from limestone which turns nearly to the consistency of putty when wet and dries out almost to that of plaster under the summer sun, when the surface cracks into characteristic diamond patterns.

The dwarf bear-poppy *(A. humilis)* is very similar in general appearance and in the organization of its flowers to the yellow but, as the name implies, it is smaller in all its parts. The leaves, an inch or two long, are less densely hairy and, therefore, of an even more intense blue, the color being enhanced in nature by a background of red sandstone. The flowering stems are more leafy and only five or ten inches tall, and the flowers, composed of only four overlapping petals of cold pure white, are enriched by the contrasting gold of stamens. In this case the petals do not fall as the flower fades, but close in withering over the forming capsule, and the plant which has been flowering for some days becomes a solid mass of white. Eventually the older petals turn brown and papery and manage to look somehow untidy or unkempt. This enchanting little poppy,

perhaps even rarer than the first, was discovered in 1874 by Dr. C. C. Parry in the valley of the Virgin River near St. George, Utah. It is still known only from thereabouts, extending but a few miles south across the state line into Arizona. Near St. George it is confined to dry sandstone knolls nearly barren, as the photograph suggests, of other vegetation.

The third bear-poppy, *A. Merriami,* combines some features of the other two, being at the same time unique in its own way. Intermediate in stature, it has leaves in size and silkiness like those of the yellow, and flowers of six petals, but these are of the glistening pure white of the dwarf, and fall readily as the flowers fade. The capsule is longer and of narrower form. It introduces a new note in that the flowers are produced singly on erect, nearly naked scapes, and the flower-buds are hairy. The white or Merriam bear-poppy was not made known until 1891, when Vernon Bailey, a member of the Death Valley Expedition, encountered it near Las Vegas, Nevada. Although of highly restricted distribution, it is less rare than related species. It is found in the dry foothills of the Charleston Mountains, at slightly greater altitudes than *A. californica,* and favors gentle slopes and low hilltops, nearly always rooting in broken limestone. Thence it has been traced northwestward through the calcareous desert mountains of Clark and Lincoln counties to Frenchman's Flat (where experiments in atomic fission, lately reported in the press, may make its tenure doubtful) and yet farther to the Funeral Mountains in California. Secure here, within the confines of Death Valley Monument, the white bear-poppy may likely continue to fulfill its unimaginable purpose in existing and reproducing itself until its admirers have long ceased to do as much.

Dwarf bear-poppy (*Arctomecon humilis*) on bare red sandstone hillocks near St. George, Utah.

If neat beauty were a sure passport to the garden, the bear-poppies would no doubt long ago have been introduced to cultivation. Some attempts have been made to do so. The late Ira W. Clokey, whose concern with the flora of the Charleston Mountains made him particularly interested in the bear-poppies, distributed ample seed of *A. californica* some ten years ago; but according to my information and experience, none was ever induced to germinate. And the same may be said of seed of the dwarf bear-poppy collected about the same time by Dwight Ripley and the writer. They should be tried again and would, perhaps, yield to a bath of weak acid, a test by fire, or some such drastic measures. But even past this hurdle the would-be cultivator will be faced with real problems. It must be borne in mind that these poppies are subjected in nature to severe conditions to which they are perfectly adjusted and probably rigidly adapted. Their period of growth is limited to late winter and early spring, after which intense heat and almost total drought, unless relieved by a chance thunderstorm during the summer months, drives them into a state of quiescence comparable to the hibernation of northern mammals. Consequently, we can recommend a calcareous or at least alkaline soil, bright light, and a period of rest after flowering as the minimum requirements; for the rest we must await experiment.

As a footnote, it may be added that a rumor went abroad a few years back that a fourth bear-poppy had been sighted by a forest-ranger in a "wash" leading into the Desert Range, a mountain mass which dominates the horizon to the northeast of Las Vegas. Moreover, the flowers were reported to be scarlet. Even making allowances for the prodigality of nature, we can say no more of this than that nothing could be more desirable, or less likely.

SOIL (from page 73)

Earthworms

Earthworms have recently received a lot of attention from gardeners. Their effect on the soil is one of those many questions that the scientist cannot answer exactly one way or the other. They are usually found in fertile soil, but whether they thrive because of it or cause the soil to be fertile, is uncertain. At least, we know that a great many of our most fertile soils have had no earthworms.

We commonly overlook the many other small animals in the soil, besides earthworms, because they move so fast. The earthworm is slow-moving and seems friendly. We see him. Since plants get some of their nutrients from decomposing organic matter and since the earthworms help decompose it, they may be said to help supply nutrients. Perhaps their moving about in the soil helps granulate it and make it more receptive of rainwater. In some soils, however, where the organic matter decomposes too rapidly anyway, the hastening of the process by earthworms tends to make the soil massive. In such soils, they are doubtless harmful.

From the evidence available, it is difficult to generalize. In most gardens in the eastern part of the United States earthworms probably do some good, but not much, and little, if any, harm. It is doubtless wasteful either to eradicate them or to propagate them. I have many in my garden, but I do nothing purposely to encourage them or to destroy them.

"To Honor Lambertus C. Bobbink"

"A great rosarian whose counsel and generosity helped to make this garden possible for the enjoyment of all."
—Inscription on tablet in Rose Garden of The New York Botanical Garden.

This lovely garden shining in the sun,
Its thousand thousand roses fragrant, bright
In scarlet, golden-yellow, pink and white,
Will hold the light until the day is done.
Color and light and silence! And a throng
Of famous roses: "Duchess," "Golden King,"
"Evelyn Thornton," "Julia Mannering."
Color, and in the silence, like a song
Soft melodies of words and colors flow
Together in each rose's lyric name:
"Red Radiance," "Crimson Glory," "Golden Dawn,"
Sweet "Star of Fire," "Irish Fireflame."
While sunlight lingers where the colors glow,
The silent shadows lengthen on the lawn.

G. W. Barnes

Cotton-Remains Excavated from a Coptic Monastery

By **Elhamy Greiss**

THE monastery of Phoebamon must have been a famous institution in olden times, as it is mentioned in several documents found in different mountain sites in Upper Egypt. The archaeological mission of the Metropolitan Museum of Art, which excavated the monastery of Epiphanius at Thebes in 1912-14, suggested that the Phoebamon monastery might be somewhere in the neighborhood of El-Deir el Bahari. But the exact situation of that ancient monastery remained unknown until it was discovered in the winter 1947-8 by the Society of Coptic Archaeology in Egypt under the leadership of Charles Bachatly.

The Phoebamon monastery is situated at the end of a narrow desert valley (Wadi) surrounded by cliffs twenty-five meters (approximately seventy-five feet) high. This site lies between Medinet Habu and Armant, about eight kilometers (five miles) north of Luxor, right in the Libyan Desert. This Coptic (Christian) monastery must have been established early in the fourth century and have disappeared before the Islamic conquest in the seventh century, to judge from the purely Roman style of its pottery which shows no influence by Arabic art.

Among the objects found in the monastery were more than three hundred drawings and inscriptions, also a number of inscribed shells and pottery herds (ostraca). These give a very vivid picture of the daily life of the monks some fifteen hundred years ago. What is of interest, especially to a botanist, are the plant remains found in this ancient site. There was a crib still filled with hay, consisting of lentil plants, *Lens esculenta,* in a very good state of preservation, with the flowers and leaves still intact. In a heap of rubbish, connected with the kitchen, all sorts of fruit stones and vegetable fragments were found. Examination of them yielded the most complete list of foodstuffs ever found in an archaeological site. A number of textiles, mostly small fragments, were sent to the writer for microscopical examination and identification.

Let me first mention that most fabrics found in the Pharaonic tombs were made of flax fibres. Even during the Predynastic era, people knew how to make the most exquisite linen fabrics. During the recent excavations of the first dynasty by Dr. Zaki Saad at Helwan, a number of linen fabrics were discovered. Their manufacture could not be more perfectly accomplished, even with the machinery of our modern times; yet they are fifty-two hundred years old.

Wool is seldom met with — it was probably considered unholy and, hence, unsuitable to be put with mummies. One of the few woolen objects ever found is a blanket from the Palace of Akhenaten at Tell El Amarna, now exhibited in the Fouad I Agricultural Museum in Cairo.

Cotton is of late introduction in Egypt and till now has not been found in the tombs. Herodotus, who speaks of an "Indian shrub carrying wool on its branches," is the first to mention cotton. Probably the Europeans became acquainted with it during the time of Alexander the Great. How and when it was introduced to Egypt is not accurately known, but it seems as if cotton reached Egypt via Nubia and Sudan, and that the first cotton fabrics were imported from those countries, possibly during the early centuries of our era. All this is still an unsolved problem.

The present Egyptian cotton culture is of very recent date. Cotton agriculture was introduced during the time of Mohammed Ali; that is, in the beginning of the last century.

When I started examination of the Phoebamon fabrics, I found that they consisted of flax, as might be expected. But suddenly I discovered cotton among them. A piece of woolen fabric was embroidered with threads red in color. Samples of the colored threads were examined microscopically; they were found to be cotton.

It was, indeed, unexpected to find the oldest known cotton fabrics in Egypt, and in the oldest known monastery of Christianity. A thorough investigation of the fabrics proved that there were several samples of cotton fabrics. Among them:

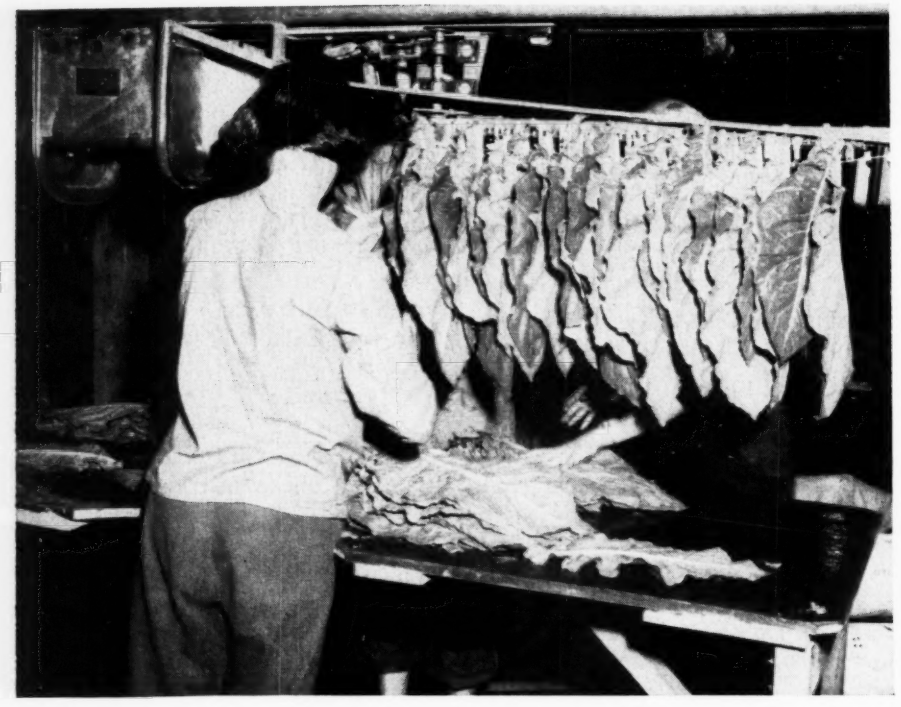
A whitish fringe, ten centimeters long, four centimeters wide (a centimeter is .3937 inch), with three tassels. The tassel had a length of eight centimeters and a width of two centimeters. This is probably a remain of a table cloth.

A piece of soft yarn, yellowish in color, seven centimeters long and varying in thickness from one to four millimeters (a millimeter is .03937 inch) and other pieces of cloth different in the pattern of their manufacture.

From where did the cotton come? Nobody knows, because neither seeds nor vegetative parts of the plant were discovered. Future research may lead to the discovery of other cotton fabrics, and these discoveries may give an answer. Up till now, very little of the Pharaonic fabrics have been thoroughly examined, but I have now started a systematic investigation of the ancient plant material present in the Cairo museums and I hope that such a survey will throw light on the history of cotton in Egypt.

THE CROP W
TO BURN

By Amanda Quack



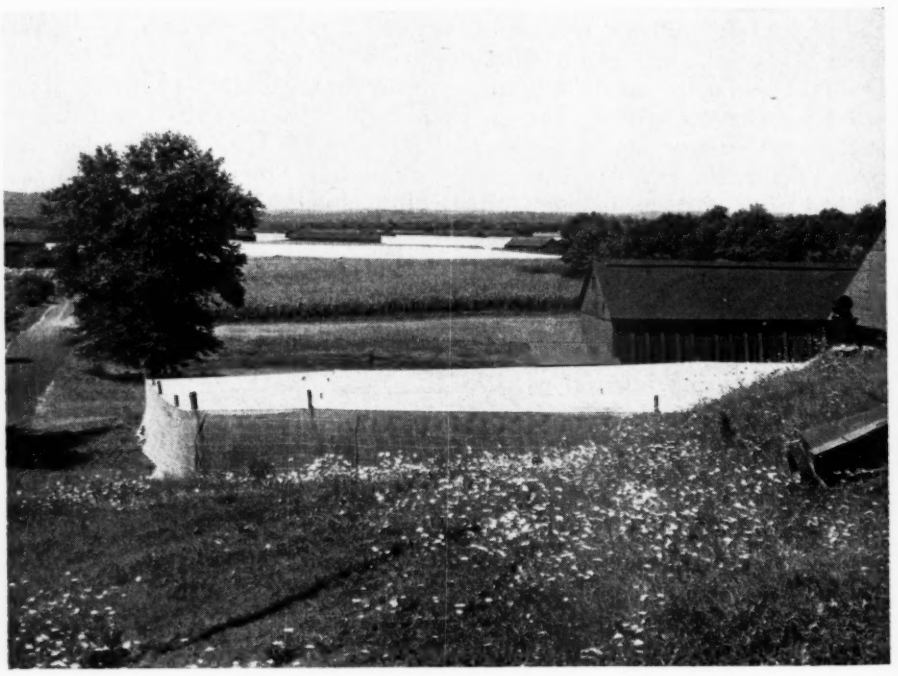
Before beginning the "cure," individual leaves of shade tobacco are sewn on laths, ready for hanging in the curing shed. Open-field tobacco undergoes the same process but the entire plants are strung on laths.

THE identity of the first smoker will never be known. This primitive and unheralded grand-daddy of today's modern tobacco industry had no idea what he was starting when he formed a twist of the "aromatic weed," ignited it and enjoyed the first puff of pungent smoke. Now, his experience is enjoyed annually in the United States alone by the consumers of some two hundred fifty billion cigarettes, five billion cigars, and one hundred sixty-one million pounds of tobacco in such varied other forms as pipe, chewing and snuff.

We do know, in a general way, what manner of man this pioneer was. He belonged to the Western World. History tells us that smoking was closely tied to early Indian cultures in the Western Hemisphere, in religious and civil ceremonies, for its therapeutic value, in social life and for plain enjoyment by the individual. These earliest Americans were indeed enthusiastic followers of the art — they consumed tobacco in any number of ways. The modern cigarette, cigar and pipe all have their very early counterparts. Snuff and chewing tobacco were in common use by the Indians long before the advent of the white man.

Undoubtedly Columbus and his followers were the first white men to witness the strange practice. When the "Pinta" landed at San Salvador, the friendly aborigines were quick to offer the strange "white gods" gifts of tobacco among other bounties, and other early explorers had the same experience. Just which expedition returned to Europe with the first specimens of the tobacco plant to reach that continent is not known, but evidently tobacco had reached Spain early in the sixteenth century. The custom spread from Spain and by the late 1500's was well established in many parts of Europe, from where it passed to Africa, India and the Orient.

Back in the New World, the tobacco plant rapidly took its place in colonial life. It was not until the early seventeenth century, however, that the "tobacco industry" was born. John Rolfe appears to be the father of tobacco culture as a commercial undertaking in North America. He first undertook the growing of tobacco for sale in



Some of the world's finest cigar wrapper tobacco is grown under shade in the Connecticut River Valley of Connecticut and Massachusetts. The shade cloth creates a warm, humid atmosphere which produces a high quality leaf, much in demand by cigar manufacturers.

WE GROW
URN UP

Quackenbush

1612; by 1616 culture of the crop had become general in Virginia.

Space prevents a description of the spread of the tobacco industry through the other colonies. Almost every colony tried its hand at producing the profitable new plant. Some areas became well known for certain types of tobacco; others failed in their attempts to grow the new crop. Gradually the industry became distributed in certain localities where climate, soil and other natural factors favored its growth.

Today, more than three hundred years later, the tobacco enterprise is still defined by such natural limitations. Tobacco is one of the most specialized crops grown in the United States and its culture is, perhaps, more intensive than that of any other plant. Not only is the crop specialized in itself but each different type grown represents an entire industry, particular to a certain part of the nation and grown for a particular reason by special methods. The cigarette, the cigar, the pipe, each has its own kinds of tobacco ingredients and there is no substituting one for another.

T. R. Swanback of the Windsor Tobacco Laboratory of The Connecticut Agricultural Experiment Station inspects a field of broadleaf tobacco. Open-field tobacco, used for cigar binders, is a big enterprise here.

Let's take a quick look at the principal tobacco-growing regions and their products. The U. S. Department of Agriculture lists seven basic types of tobacco grown in the United States. The first of these is flue-cured (Bright tobacco), grown primarily for cigarettes but used, to a smaller extent, also for pipe and chewing tobacco. The principal states where it is produced are Virginia, the Carolinas and Georgia. Next is the fire-cured type, grown mainly in Virginia, Kentucky and Tennessee, and used in the production of snuff, smoking and chewing tobacco.

Air-cured tobacco, the other important non-cigar type, is further divided into two classes, light and dark. Burley and Maryland air-cured, both predominantly cigarette tobaccos, make up the light air-cured class. Maryland is grown almost exclusively in the state that bears its name, the Burley-producing areas are Kentucky, Tennessee, Ohio, Indiana, West Virginia, North Carolina, Virginia and Missouri. The dark air-cured, used largely for chewing tobacco, is grown chiefly in Kentucky and Virginia.

Newest wrinkle in curing tobacco in the Connecticut Valley is the use of propane gas burners for lowering humidity and increasing temperature. Many growers have now switched to gas firing, believing it to result in a better cure than the charcoal fires they used formerly.

Cigar tobacco is divided into three general types, dependent upon the portion of the cigar for which it is used. These are filler (the innermost part of the cigar), binder (the middle section) and wrapper (the outer layers). Filler is produced largely in Pennsylvania and Ohio, binder in the Connecticut Valley of Connecticut and Massachusetts, with some coming from Wisconsin, and wrapper in the Connecticut Valley, Georgia and Florida. The seventh class of tobacco, the U.S.D.A. labels "miscellaneous." The most important kind falling in this category is Perique, a specialized type grown in Louisiana for use in high-grade smoking blends.

It would take a text book to describe in detail the procedures in the production of these many types of tobacco. Hence, we shall have to confine ourselves to a very brief description of tobacco culture in one section. The Connecticut Valley would seem to be a good choice. Here, fine cigar wrapper and binder leaf are grown, commanding the highest price of any tobacco in the nation, and the work behind the production of this unique crop is probably more intensive than in any other area.

The tobacco season in the Valley begins in early April, when the seeds are planted in the seedbeds or cold-frames in which the tobacco plants get their start. Steam sterilization of the beds has been common practice in the Valley for many years. Done in the fall or in the spring prior to planting, steam treatments destroy weed seeds and check such diseases as damping-off and bed rot. Recently, fumigation with methyl bromide, a method developed by scientists at the Windsor Tobacco Laboratory of The Connecticut Agricultural Experiment Station, has largely supplanted sterilization. Methyl bromide is easier to use than steam and gives superior results.

Besides sterilization or fumigation, the beds require constant care in other ways before the seedlings are large enough for transplanting into the open field. The developing plants must be kept moist if the stand is to be even (automatic watering systems are now almost universal among the larger growers), the beds must be ventilated for several hours each day, and control measures for specific disease or insect pests must be undertaken if such troubles appear.

Once the seedlings are ready for transplanting, the grower's work begins in earnest. The young plants are usually ready for this step in late May. During the interval, in addition to caring for the seedbeds, the fields have been plowed, harrowed and fertilized preparatory to the arrival of the seedlings.

Havana Seed is one of the three main types of tobacco grown in Connecticut. This is a special variety of Havana Seed, bred for resistance to the mosaic disease by scientists at The Connecticut Agricultural Experiment Station's Tobacco Laboratory.

In many tobacco-growing areas, crop rotation schemes are followed and give best results. In the Valley, the exact reverse is true. Continuous cropping to tobacco is the rule and, over the years, has given higher yields and quality than attempts to alternate tobacco with other crops. However, land on which tobacco is grown year after year requires heavy fertilization, and adequate amounts of all essential elements must be available to the rapidly-growing tobacco plant. Mixtures commonly employed in the Valley are 8-4-8 and 6-3-6. The rate of fertilization averages 3,500 pounds per acre or, where manure is used in addition, 2,000 to 2,500 pounds.

In the seedbed, all three types of tobacco raised in the Valley are treated identically. Once ready for the field, however, two distinctly different methods are used. The hardier Broadleaf and Havana Seed types, destined to become cigar binders, are set in the open field while the more delicate Shade tobacco, grown for cigar wrappers, is raised in an artificial, hot-house atmosphere under tent cloth.

The miles of cloth-covered Shade tobacco fields in the Valley, a mecca for tourists each summer, represent an attempt to duplicate the tropical atmosphere of Sumatra where some of the world's finest cigar-wrapper tobacco is grown. The success of the attempt can be measured by the fact, already mentioned, that Connecticut Valley wrapper tobacco brings the highest prices in the country. The humid, warm atmosphere created by the shade cloth produces a fine, smooth leaf with small veins, the type desired by manufacturers of quality cigars.

Once the transplanting chore is done, whether under shade cloth or in the open, the tobacco fields become a busy place. Cultivation begins soon after the young plants are established, side dressings of fertilizer may be applied, a constant war with diseases and insects is waged, and the plants are topped and suckered to add strength to the stalk and force the leaves to develop. By removing the terminal buds and lateral shoots, the plants can put all of their energy into producing the valuable leaves desired by the grower.

With the harvest, though, activity in the fields reaches its highest peak. Two distinct types of harvest operations are followed in the Valley. The Broadleaf and most of the Havana Seed crops are stalk cut with a specially made tobacco hatchet. The stalk is severed just at the surface of the soil and then the plants are allowed to lie on the ground for an hour or two until they are wilted and limp so that they will not break when handled. Next, the plants are strung on four-foot lath by means of a steel spear head, about six plants to a lath. Then, the laths are transported from the field to the curing shed.

Harvesting shade tobacco is another story. The procedure here is called priming. Instead of being harvested all at one time, individual leaves are picked from the plant as they mature. Starting with the lower leaves, about four are picked at each priming and the process is repeated on an average

of once a week. The leaves are gathered in baskets and taken to the curing sheds, where they are sewed on the same type of lath used for stalk-cut tobacco. The leaves are sewed onto the lath in pairs, each lath accommodating about twenty pairs.

Once in the sheds, the laths are hung upon poles and the tobacco begins the series of chemical changes which constitute curing and transform the raw green leaves into mild, fragrant tobacco. The cure is the trickiest part of the whole tobacco growing story. If the leaves dry too rapidly ("hay down," as the growers call it), the cells die, the leaf remains green and curing does not take place. If the curing is too slow, the leaf becomes too dark in color and also is exposed for a longer time to the danger of pole rot and other curing troubles. Exactly the right combination of temperature, humidity and air movement must prevail to achieve the happy balance which results in a properly cured leaf.

Tobacco sheds are provided with ventilators which may be opened or closed, as the weather directs, to regulate the cure. Some growers are now equipping their sheds with fans to further control air movement. To lower humidity and raise the temperature during damp weather, the common practice for years has been to employ charcoal fires. Within the last year, "firing" the sheds with liquid petroleum gas burners has become quite common and seems to give a more uniformly good quality cure. Gas firing also has the advantages of requiring less time and labor and of being cheaper than charcoal.

The curing process usually takes a month or so. The grower then waits for a damp spell so that the leaves can be handled without breakage. In the case of open-field tobacco, the leaves are then stripped from the plants and wrapped in heavy manila paper in bundles of thirty to forty pounds each.

The open-field tobacco is now ready for sale. Shade-grown leaf has one further step before it is put on the market. It is transported to the warehouse where for six to eight weeks it undergoes a natural fermentation process, during which the piles or "bulks" of about 4,000 pounds each are not handled at all, except to shift the piles so that the outer leaves are moved to the center and the inner ones, which heat and ferment more rapidly, are brought outside.

In other areas the cultural operations vary widely. Air-curing, with artificial heat supplementing it, as used in the Valley, is completely different from the flue and fire-curing methods used in the cigarette districts. Each locality has its particular harvesting procedures, established by tradition and conditions in the specific area. Disease and insect problems vary widely in various parts of the country. But in all areas the growing of tobacco requires specialized handling, vastly different from any other crop, and into its culture go more hours of labor per acre than any other agricultural enterprise.

From the peace pipe and ceremonial offering of the Indian, tobacco has come to be big business. In the United States alone, 1,970,376,000 pounds were produced in 1949. A few figures from the Connecticut Valley alone will illustrate the growth of an industry. Today, the Valley's No. 1 crop is worth $50,000,000 annually and twenty-five hundred growers and forty-five thousand workers are required to produce it. The crop we grow "to burn up" has become a Goliath. That first smoker, forever clothed in anonymity, really "started something."

BOTANY **(from page 71)**

leaves of several species of oak. The best red inks are still made from a dye obtained from brazilwood, a South American member of the legume family. India ink, however, is made from soot obtained by burning pine wood and lampblack obtained by burning the oil of sesame. This same sesame oil is an ingredient of margarine and is valued in many countries as a cooking oil.

Dyes for food materials are also derived from plant products, and some of the better cloth dyes are from plants. However, all of these botanical dyes are being replaced by the cheaper dyes obtained from coal tars. Saffron and annatto are the most common materials used for coloring foods. Saffron is obtained from the yellow-orange styles of the crocus plant, and annatto is obtained from the seed of a handsome tropical American tree. Annatto produces a brick-red color when used in concentrated form but can be diluted to produce a pale yellow color. It is used in coloring cheese, margarine, butter and soap.

Fatty oils and waxes obtained from plants occur frequently in such industrial products as soaps, candles, margarine and cooking oils. Fatty oils from plants differ from the essential oils of perfumes in that they are fixed, not volatile, and do not evaporate. They are bland oils lacking strong taste or odor and are indispensable as foods for man. Fatty oils are found in a great variety of families in the plant kingdom, and while they are generally extracted from seeds, they may also be found in fruits, tubers and stems of plants. Not all fatty oils are immediately edible, but by the addition of hydrogen through chemical treatment the majority of fatty oils can be made suitable for human consumption. This process is known as hydrogenation and many labels on cooking fats read "hydrogenated vegetable oils."

The oils of coconuts, peanuts, kapok, cottonseed, soybeans and corn are used in margarines. Oils from olives, corn, peanuts, and sometimes cottonseed are widely used as cooking oils or salad oils. The oil of the castor bean has a well-known medicinal use.

Oils from soybeans, oil palms, nutmegs and the carnauba palm are used commonly in the manufacture of candles because of their high melting point. Of course, New England has a traditional use of the oils and waxes from the fruit of the bayberry in making candles with a special aroma.

When fatty oils are treated with an alkali, a soap is formed. The fatty oils from such plants as the tung tree, corn, soybeans, olives, peanuts, coconuts and the oil palm are used in the manufacture of soap.

The carnauba palm of South America stands alone as the principal source of a high-grade wax used in furniture polishes, car polishes and shoe polish. The young leaves of the carnauba palm have a layer of wax on the surface, which is removed by scraping the leaves. It is then placed in water, and the wax film is compressed into cakes to be refined and ultimately sent to the large American market.

(Continued on page 89)

"... I Leave Thee Lilac with Heartshaped Leaves ..."

By **Bernard Harkness**

NO BARBARIC yawping is this lovely line from Walt Whitman's poem, "When Lilacs Last in the Dooryard Bloom'd," in which the poet's deeply felt grief at the loss of a beloved President is assuaged by an offering of lilac flowers. To represent this country in the world's literature, no more indigenous voices could be selected than Walt Whitman and Henry David Thoreau. As the latter's tribute to the lilac is less well-known, I quote it from "Walden":

> "Still grows the vivacious lilac a generation after the door and lintel and the sill are gone, to be plucked by the amusing traveler; planted and tended once by children's hands, in front yard plots — now standing by wallsides in retired pastures, and giving place to new-rising forests — the last of that strip, sole survivor of that family. Little did the dusky children think that the puny slip with its two eyes only, which they stuck in the ground in the shadow of the house and daily watered, would root itself so, and outlive them, and house itself in the rear that shaded it, and grown man's garden and orchard, and tell their story faintly to the lone wanderer a half century after they had grown up and died — blossoming as fair, and smelling as sweet, as in that first spring. I mark its still tender, civil, cheerful lilac colors."

It is this genuine sentiment for lilacs that nullifies all attempts at an objective evaluation of their worth as landscape material. The obvious faults of the common lilac as stiff and awkward habit of growth, susceptibility to injury from insects and fungi, lack of autumn foliage color, short season of bloom and coarse foliage texture, will exclude them from some garden plans. But Americans love the lilac and they come by the thousands to view a public collection in flower. One certain way for a city park to gain approval and support is to plant a lilac collection.

An objection sometimes made of the larger collections of lilacs is that there is a considerable sameness in the flower color. It should be emphasized, however, that lilac names represent entities that have arisen through seedling variation or bud mutation within one species only and that the term, French hybrid, so often used, is a misnomer. True, there are hybrids of other lilac species crossed with common lilac but they are quite distinct in character. Contrasting the mixture of genes that produced the modern rose with the restricted ancestry of the new lilac varieties, we may marvel at the range of size and coloring which we have. No one would deny that there are far too many lilac varieties all too similar to interest the home gardener. So it is that there are published lists all the way from the three best to the one hundred best, to aid him in selecting varieties. The arboretum collections which keep the old varieties offer a good opportunity to study the developments that horticulturists have achieved within one species.

There is available in W. B. Turrill's THE PLANT-LIFE OF THE BALKAN PENINSULA a wealth of information about the native habitat of *Syringa vulgaris*. Though introduced as a garden plant into Europe about 1563 from Constantinople (Istanbul), its place of origin was not established until 1828. Linnaeus and the early botanists attributed the lilac to the Orient and considerable evidence accrued before horticultural writers accepted the change. Turrill considers that the presence of *Syringa vulgaris* in Europe isolated from the main distribution of the genus in China indicates it to be a relict species, representative in that region of an older flora of the Tertiary epoch. Its association in nature is in areas of shrubby growth called shiblyak which appeared after removal of forest growth over wide areas in the Balkan countries. Other plants of this association well known in gardens are smoke-bush, *Cotinus coggygria,* European barberry, *Berberis vulgaris,* and wayfaring-tree, *Viburnum Lantana.*

Common lilac comes from a region of continental climate; that is, hot summers and cold winters with precipitation in all seasons. As the early American settlers, who had brought the lilac over to embellish Colonial gardens, pushed westward they found they could take this plant with them to the harsher extremes of the interior. In the present-day trend of moving after retirement to the mild climate of Florida and the Gulf States, gardeners are finding they have to give up growing lilacs, however disturbing it may be to some. The southern border line of effective lilac culture was once defined by Furman L. Mulford, in a Farmers' Bulletin of the U. S. Department of Agriculture, as the point where ice of sufficient thickness to hold the weight of small boys forms on shallow ponds. Curiously, though, lilacs are adaptable to a Mediterranean climate, becoming dormant during the summer dry period. For example, at San Jose, California, where small boys do very little skating, W. B. Clarke is growing many varieties and breeding new ones; there lilac flowering is expected in April. With the more erratic springs at Rochester, New York, lilac flowering has been as early as April 29 (1945) and as late as June 8 (1924). The average date from a record of the last forty-six years is May 24.

It adds to one's interest in lilacs to be able to see in collections the old varieties whose history has been so painstakingly recorded in Mrs. McKelvey's monograph, THE LILAC. The first-known double, Azurea Plena, exhibits little of the richness of its descendants. It was available in the 1870's to the Lemoines, Monsieur and Madame Victor, who with great difficulty procured a few seeds from its very imperfect flowers. These seeds

transmitted its doubling factor to the long line of double lilacs that we now have. Today, Azurea Plena makes a spreading plant wider than high, bearing profusely its small clusters of light-blue flowers with a light pink-to-violet reverse. A plant which catalog references establish as over one hundred years old is Princess Marie, with single light creamy lilac flowers. Though not one of the earliest varieties, the Spaeth introduction of 1906, Hyazinthenflieder, a single with flowers now becoming somewhat larger, in light purple shadings, is of interest for its resemblance to a hyacinth floret.

It is not conservatism or sentiment alone which keeps the older varieties dominant on the lists. About ten years are necessary to establish a plant so that its flowering may be considered typical. The introductions of the years 1938-42 should by now begin to show their true colors, something of the habit of the plant and the abundance or sparseness in its flower production. Not all collections will have been able to collect in every year the current crop of introductions, but with this reservation understood, these names should be looked for to compare with the older varieties:

Monique Lemoine and Souvenir D'Alice Harding are two double whites from the French firm of Lemoine, which still continues to introduce new lilacs. Blue Hyacinth, a single blue, came from Clarke in 1942 along with Alice Eastwood, a double lilac-pink, and Kate Sessions, a single reddish purple. Another Californian, Eden from Oliver in 1939, is single and magenta in color. Gismonda from Lemoine in 1939 is a double in the reddish purple class.

What will the future bring in lilacs? American breeders as W. B. Clarke, San Jose, California, and Edward Gardner, Horicon, Wisconsin, promise attention to varieties giving the large flowers and clusters of the modern lilac with clearer colors in the less crowded color classes. Other growers will certainly continue to contribute their best selections. From Holland comes word of two color breaks which may extend the color range in new directions. Certainly of interest to the gardener, when introduced, will be the variety Sensation, a sport of Hugo de Vries; it is sensational in that it is the first bicolor, a single dark purple edged white. The variety Primrose is the first approach to a yellow lilac and its importance was recognized by an award of merit of the Royal Horticultural Society on May 23, 1950. It is color-charted as barium yellow — and it must be remembered that barium is not gold.

Even though they seem to survive long periods of time without care, lilacs respond to good cultural practices. They appreciate most of all an open site in full sun free from competition with tree roots. If one starts with the usually recommended planting method of adding plant food below the depth of the roots, the lilac plant should not need additional fertilizer until it is well settled into flowering. Then light applications of fertilizer may be worked into the area around the trunk. Cultivation is an important aid in keeping suckers under control.

Named for his granddaughter, Joan Dunbar, in 1923, by John Dunbar, late Superintendent of the Rochester Parks. Its long tube and narrow petals give a unique fleecy effect.

Intelligent pruning is restricted to aiding a plant to attain a normal growth habit. What, then, is a normal lilac plant? Let's look at a plant of President Grevy set out in Highland Park, Rochester, in 1892. It stands twenty-eight feet tall, has a basal trunk of coalesced branches of over two feet and the crown spread is twenty-one feet. Picture a plant this size in the spot where we have our lilacs in our gardens and, in most cases, it just wouldn't fit. However, sixty years is a long span which many gardens do not attain. Lilacs are normally slow-growing — they advance in height about the rate of a foot or slightly more per season, although some of the new vigorous kinds seem to race toward tree stature.

Can something be done along the way to prevent lilac bushes from becoming trees? Fortunately, yes. A vigorous plant which has become established on its own roots will develop sucker shoots from the base, and the removal of these becomes an annual task. One or two stout ones near the base should always be left. When the original shoots have grown to a height where the terminal blooms are too high to be enjoyed, cut down that stem to ground level. If this is done on a yearly schedule rather than all at once, old straggly plants can be rejuvenated without loss of flowers. The young shoots with their deep green leaves and large clusters of bloom soon amply replace the old trunks.

Winter or late fall pruning should not be undertaken with a heavy hand. The flower buds are set on the terminal branches at that time and any barbering operation to a uniform height will cut off next year's flowers. Work, instead, to reduce the inner weak branchlets, branches that rub on each other, and borer-weakened wood. It is considered helpful toward an annual flowering of lilac plants, if the old flower clusters are nipped off before seed production starts.

There are a few insect enemies of the lilac. The most devastating, when unchecked, is oyster-shell scale which attacks young plants or the new wood on older plants. Scale insects multiply rapidly and suck the juices from the plant; its plight soon becomes obvious. Control is effected by a dormant spray with miscible oil or, in June, when the young are crawling, a nicotine sulphate and soap mixture will kill all the insects it hits.

The shredding bark of older trunks of lilac is the place where the adult, a clear-wing moth seldom noticed, of the lilac borer prefers to lay eggs. Its life cycle seems to vary in other sections, but at Rochester the young borers are most easily found the first week in August when they first eat into the bark and make sap-wet spots. A splash

of carbon bisulfide from an oil-can finishes them off. A later check should be made for holes showing fresh sawdust in which carbon bisulfide can be injected; the holes can then be closed with putty or beeswax.

A leaf miner that is sometimes epidemic may be controlled by a nicotine spray as soon as the tiny worms are found at work inside the leaves.

Except for the nuisance of powdery mildew in some seasons and in situations of poor air circulation, lilacs are generally immune from fungus diseases. There may be virus troubles in store, but they have not appeared extensively as yet.

Through the country more lilac collections are becoming available to the public. At Lilacia Park in Lombard, Illinois, is a large collection begun in 1911 by the late Col. William R. Plum. The Morton Arboretum at Lisle, Illinois, has a complete collection of the Asiatic species and their hybrids as well as the varieties of the common lilac. At the Arthur Hoyt Scott Horticultural Foundation, Swarthmore, Pennsylvania, lilac plantings reflect the interest of the best-informed man in the country, John C. Wister, editor of "Lilacs for America," 1941 Survey of the American Association of Botanical Gardens and Arboretums. At the Rochester, New York, Highland Park collection the introductions of John Dunbar may be seen. The scarcely distributed varieties named by the late T. A. Havemeyer may now be seen at Lilac-Land, his former estate at Brookville, Long Island, and in the collection of The New York Botanical Garden. The Arnold Arboretum at Jamaica Plain, Massachusetts, has one of the oldest collections in the country. A new collection of note is in Ewing Park, Des Moines, Iowa.

We may safely say that the lilac will continue to be a favorite plant in the United States. We have many attachments that reflect inheritances from Europe. There are these ties from the Old World with the lilac: the Slavic for its home in the Balkans, the French for its horticultural development and popular identification with that country, the Dutch for its wide use as a winter-forced flower in the Netherlands, and the English for its high place in their affection and regard as a garden plant.

TREE PEONIES

By **Harry Wood**

MAY is a glorious month in the flower garden, when many of the finer perennials are at their best. Among the more important ones are the peonies. There are several types which will give flowers over a period of at least three weeks. The best known, the old herbaceous garden peony, *Paeonia albiflora,* flowers the latter part of May, while the newer kinds, such as the *officinalis* hybrids, flower two weeks earlier. These new hybrids come in a great variety of brilliant, almost opalescent colors in some cases. The flowers are single, supported on stout stems.

The tree peony, *Paeonia suffruticosa,* is an attractive and colorful flowering shrub, sometimes reaching a height of four feet and often bearing up to fifty or one hundred blooms eight inches in diameter. The fine modern varieties were introduced to America and Europe toward the end of the last century. Most of them are single when the plants are young, but are apt to develop semi-double flowers when they have become large and well established. They flower much earlier than the herbaceous peonies, about the 10th of May. The color range includes white, several shades of pink, scarlet, crimson, purple and very deep maroon. In addition, many of the varieties are attractively marked at the base of the petals, and some have highly colored carpels and stamens. The texture of the flowers is magnificent; the petals of some of the varieties are wavy, resembling a piece of fine silk.

The yellow tree peony, *Paeonia lutea,* hybrids flower about two weeks later. The flowers of the double varieties are very heavy and are apt to hang down under the foliage. The single ones, which are of more recent introduction, bear their flowers upright on strong stems, making much more attractive plants.

Tree peonies are not as widely grown as they deserve to be, because it is assumed by many people that they are very expensive and difficult to obtain. This is not really true, as today several nurseries are specializing in growing and marketing them. They are, however, a little more expensive than the common early flowering shrubs, for they are more difficult to propagate. The plants produce only a few buds on a stem so only a few cions can be taken from even a large plant. Formerly, the wild purple form of the Moutan peony was used as the understock for the cions, but the Moutan is such a vigorous grower, sending up numerous suckers, that it was hard to distinguish the shoots of the graft and often the grafted variety was smothered out. In recent years, the root of the herbaceous peony has been used more successfully.

Grafting is done in late August and September and the grafts are heeled in in a coldframe without any covering until October, when they are lifted and planted in another frame about six inches apart. As the weather gets colder, the frame is then covered with sash. No special protection is needed other than a light mulch of salt hay which must never be allowed to become saturated with moisture. They must have good air circulation and sufficient ventilation can be given by raising up the glass sash on good days. The following spring the sash should be replaced by lath shade which will protect the young plants from strong sun. The young plants should be grown on in the frame for a year and a half and then moved into a permanent position.

Propagation is also done by seed, but it is a slow and uncertain process. Seeds from the finest varieties do not come true to the color of the parent plant; however, if enough are planted there is a good chance of getting fine and varied colors.

Tree peonies are not hard to grow.

(Continued on page 89)

For the Younger Generation of Gardeners

Advice for Young Gardeners

By Alfred Bate

THE best advice that could be given to anyone who wanted to garden is to start. That may seem a silly statement. But is it? Think it over. The best instruction given anyone by an expert swimmer will not teach him to swim, unless he gets into the water. All advice as to how to hold and shoot a marble will not make one a good player, unless he begins to play. But gardening has this advantage over other sports; no matter how crudely one begins, no matter how poorly the soil has been prepared, he usually gets some kind of results — because the seed or bulb is *willing* to grow, even anxious to grow. Advice given along this line merely helps one to make it easier for the plant to do its best.

You are not going to be told how to hold your garden tools; that will come naturally as you get accustomed to using them. Every gardener has a particular way in which he uses some tools. It's the result that counts, not the method of handling the tool.

But you are going to be told how to do things thoroughly. And to do things thoroughly is the golden rule of gardening. Whether a seed bed is being prepared or a border for plants; whether watering is being done; or plants tied up; or weeding; or seedlings being transplanted — do each job thoroughly, if you expect the best results.

Looking back to the days when, as a child, I first began to garden, I recall thinking many of the things done by grown-up gardeners seemed useless work. Why dig a whole spade depth down and spend so much time breaking up the soil? Did not sunflower seed and cornflower seed fallen from last year's plants upon uncultivated soil come up? And why rake over and over the spaded earth till the lumps were broken and the upper part was almost as fine as sand, when the lumps would crumble in the first long shower?

I was told to try both methods, using the same kind of seeds. So I carefully prepared a strip of ground and planted some seeds in the finely raked soil, and then I planted some seeds in earth that was barely scratched and loosened enough to receive them. I noticed two things. The deeply-dug, well-prepared bed did not dry out as quickly as the other strip and in a rain it absorbed water better, it absorbed rain while in the unprepared earth the rain merely drained off, and there were fewer seeds washed out. The other thing I noticed was that not only did the seeds in the prepared soil come up better and more evenly but, as time passed, the plants did better, grew faster, were healthier, and flowered much sooner than those in the unprepared earth.

All of which is very easily explained when you think about it. In the hard, unprepared soil the young seedling has to use a great deal more energy to send its roots down than in the looser soil. In the unprepared earth, soil moisture rises to the surface more quickly than in loose soil and so the unprepared bed dries out sooner. As plants need water which is taken in by the roots, the dried-out soil stunts the growth of the seedling and retards its growth.

The fact that loose soil retains moisture is easily understood. Soil moisture rises to the surface and evaporates through fine hair-like channels in the soil. When the earth is broken up and pulverized, these channels are broken and the moisture is retained in the soil. You can easily prove this for yourself. Several days after a rain dig down a couple of inches into the firm soil and you will find little or no moisture; but if you dig the same depth in loosened soil, you will find the ground is still moist.

A few lines above, mention was made of the effect of rain on well-prepared and unprepared earth. Let us now look into this. In a drizzle or a light rain, no damage is done in either area, the water gradually sinks in. But a strong shower or a heavy downpour will do a great deal of damage in the unprepared area. In the case of well-prepared earth, the rain can sink down quickly through the loose soil, thoroughly saturating it to a goodly depth as there is about a foot of it; but the mere inch of the unprepared soil is soon completely filled and the solid ground beneath cannot absorb the water quickly, so it drains off the seedbed and often carries the seed with it. You can prove this point readily by experimenting with a sponge: take a dry sponge, which will represent the unprepared earth, its surface is hard to the touch and when you pour water on it, the water does not sink in but runs off; however, if you squeeze that dry sponge, thereby crushing its hard surface and then pour water on it, you will find the water is rapidly absorbed.

Another point to notice in this connection is the effect of a heavy downpour upon each plot of earth. You will always find that on unprepared soil, heavy rains will make channels in the bed's surface as the water drains away. Beside washing away the seeds, these channels form depressions which will become mud holes during every later rain and whatever seeds are left to germinate will rot as their roots cannot develop healthily in a mud puddle. Roots need air as well as water for their growth and in a mud puddle the water has crowded the air out of the soil. In well-prepared soil, there is far less chance of gullies and mud puddles being formed by heavy rains and though seedlings may be beaten down, they usually can recover and continue their growth.

Another point to emphasize here is that lumps should be thoroughly broken up in the lower part of the dug area; one should not depend upon merely pulverizing the few top inches only. If these lumps are not broken, they cause trouble in several ways. There will be large air spaces between them and into them the plant roots will descend only to dangle in air without contact with soil or moisture.

Shortly the little plant will die, for its roots need three things—soil, moisture, and air. Then, also, the soil around these air spaces will settle during heavy showers. As the earth sinks, depressions will be made in the surface of the bed which will form the mud puddles that have been mentioned above. If you want a golden rule for all gardening, one which should be lived by at all times, remember this: spade deeply, hoe thoroughly to break up lumps, and rake the upper ground finely before sowing the seeds.

Seed sowing is another operation which should not be done carelessly. There are two methods of seed sowing: broadcast, or over the entire area, as when you want a bed of only one kind of flower such as poppies, which are very difficult to transplant, or portulaca, or sweet alyssum; and in rows from which the young plants will be transplanted into their allotted spaces later on. In both cases, the seeds should be sown as evenly as possible to prevent crowding and the troublesome job of thinning the little seedlings later on.

When broadcasting, you may mix the seed with three or four times its amount of fine sand. The mixing may be done in a small and dry tin can or glass jar and then poured into your left palm, from which pinches may be taken and scattered over the soil as evenly as possible. When the seeds come up, you will always find that no matter how carefully you sowed, there will be groups of crowded seedlings which will have to be thinned out as soon as possible.

When sowing in rows, it is best to mark the row by placing a rake handle or a square stick on the surface of the soil and pressing it into the soil enough to make an indentation. In this groove, the seed is sown as evenly as possible—and not closely together. When the seeds are large enough to be seen, you can sow them about an inch apart and cover them with sufficient soil to hide them completely. I prefer to press the seeds gently into the earth before covering them, for this puts them in close contact with the moist soil which hastens germination. You will probably have seeds left over, but don't try to crowd them into the row for that will be courting trouble later; you will have to thin out the seedlings, or they will be less lusty and less healthy plants, or they will rot—"damp-off" is the technical word to be used here.

Sowing fine seeds is not so easy. You may pour the seeds from the packet into the left palm, as you do when broadcasting or sowing larger seeds and sow pinches of them at a time; but if your hands are damp, the seeds are inclined to stick together. A better way is to cut with a scissors the end of the seed packet—don't tear it for that leaves a ragged edge which may hold back the flow of the seeds. Then, holding the packet in one hand and with the open end inclined toward the seed row, tap the hand which holds the packet gently and regularly with the other hand so as to cause a slow flow of seeds from the packet, as it is gradually moved along the seed row. Don't be distressed, if you don't get an even flow of seeds. I shall confess that after many, many years of seed sowing, I very seldom have been able to sow a perfectly spaced line of small seeds.

You are not going to be inflicted with directions as to how to transplant seedlings—and larger plants. All that need be said on this point is to do it carefully and carefully get soil in among the plant's roots. You will develop your own methods, that is, if you are any kind of a gardener. But something is going to be said about the art of watering — for it is an art.

Gardeners sprinkle too much and water too little. Sprinkling is spraying the foliage and the surface of the soil; watering is saturating the lower parts of the soil, where the roots of the plant can get the needed water in the right place. Surface watering, sprinkling, tends to bring up the plant roots to the top layer of soil, when they should be going downward and so subjects them to a drying out when the sprinkling is omitted. Sprinkling may be a very pleasant sport for some who like holding a hose and waving it about, or delight in watching the circles of spray sent out by a circular mechanical sprayer. But sprinkling is not for the plant's best well-being. Of course, there are periods of hot dry weather during our summers when the foliage of the plants does need to be sprayed; but it is usually and necessarily that the soil needs the water most. In dry weather, a thorough soaking is of far more value than a surface wetting. This is best done by taking off the nozzle from the hose and placing the hose end on a plate or plant saucer; with the water turned on just enough to have a gentle flow over the plate, let the water run until a wide area is dark with moisture. Then change the plate to another location. This gives a thorough soaking of the earth which will last for many days; it will not draw up the plants' roots to the surface soil — and it does not waste water.

OUR ROCK GARDEN

At The New York Botanical Garden in the Bronx is a beautiful rock garden. It is especially lovely in the spring. I have gone there alone and felt not the least lonesome. On one occasion, only a half-dozen other people were there during the hour and a half of my visit — at least they were all that I noticed.

It was a bright, sunny morning. Before walking around the garden and examining it in detail I stood still and looked. It was so beautiful my powers of appreciation seemed inadequate, yet I wanted to fix its beauties in my mind: its rocks, its water with the sunlight and shadows playing on it, its greenery, the many soft and gay colors of its flowers, and the background of trees and deep shades that gave the sensation of enclosure and privacy.

Notebook in hand, I began a close inspection of all the little beauties that had until then been merely spots and patches of color, albeit some whose special shades of color were very familiar assumed for me their characteristic forms even at a distance. My memory needs props. The jottings in my notebook serve as such.

As I walked on I gradually became aware of an insistent bird song. After a bit I realized I must be listening to the white-throated sparrow's Peabody song. "Old Sam, Peabody, Peabody, Peabody, Peabody," it sang, persistently, melodiously, happily. It would be nice if we could voice our feelings that way, without annoying anybody. No, I could not be lonesome in such a beautiful place, on such a beautiful day, and with the "Peabody bird" around, singing until his throat must have hurt. If I had wanted to quicken my pace a bit I could have reached New York City's traffic and noise in five minutes, perhaps, or less. I did not want to. Instead, I watched the bird among the trees across from the daffodil meadow. He was about the size of a sparrow, with smooth, shining brown back, moderately long forked tail, dark slender bill, and light under parts. When he flew, it was with deep dips.

It is easy to be lonesome in a crowd, but not in a quiet place with the birds and flowers, water, rocks, and trees.

MRS. CHARLES R. BOWLES
in *"The West Center Courier"*

BOTANY (from page 83)

Another use of plant products is in the manufacture of rubber. Many plants will yield rubber, but for all practical purposes the plantation-grown plants of *Hevea brasiliensis* are still the main source. The trunks of these trees are tapped to allow a latex to run from special cells in the bark. This latex is collected, smoked to a firm consistency and shipped to the United States, where chemicals such as sulphur and lamp black are added before the compound is heat-treated in a process known as vulcanization. It is this process that makes the latex the elastic, resistant rubber we find in rubber bands, rubber gloves, floor mats and similar products available in the grocery store.

A latex similar to rubber and called chicle is obtained by tapping the sapodilla tree. Chicle latex is dried, powdered, purified and then mixed with sugar and flavoring compounds to form chewing gum. A piece of gum generally contains about 15% chicle.

A final industrial use of plant products can be found in the grocery store in the processed wood products. Tooth picks, made principally from birch wood, match sticks from pine, and salad bowls of birch or mahogany represent unaltered wood. However, mascerated wood is pressed into the form of spoons, forks, bowls, mats, chopping blocks and similar useful articles available in a large market.

EDITOR'S NOTE. Part II of Dr. Howard's article, telling what families of the plant kingdom are represented on the shelves of a grocery store, will appear in the July-August issue.

TREE PEONIES (from page 86)

Given the proper kind of soil conditions and location, they will do very well for many years. They grow well in full sun or, better still, in semi-shade. As they break into bud very early in the spring, they should be planted, if possible, in a position that has a southwestern exposure. This will tend to delay the spring growth and lessen the danger of injury from late spring frosts. It will also help prevent the flowers from being exposed to the sun during the hottest part of the day.

Thorough preparation of the soil is necessary for any plant and this holds true of the tree peony. While they are not exacting in their demands, they are great feeders, so the soil should be well prepared before any planting is done. Like lilacs, they prefer well-drained, sweet soil, rich in nutrients and organic matter. After they are established, applications of lime, superphosphate, and an inorganic fertilizer, such as 5-8-5 or 4-12-4 formula, can be applied each year.

Invitation to

ROSE-GROWERS' DAY

at The New York Botanical Garden

The Tenth Annual Rose-Growers' Day at The New York Botanical Garden will be held on June 5. The rose garden, with its more than seven thousand rose plants in variety, will be visited between the hours of 10 a.m. and 12 noon. In the afternoon Edwin De T. Bechtel, an authority on roses, will talk on "Rose Varieties." This talk will be followed by an "Ask the Experts" period and a demonstration on how to judge a rose. There will also be arrangements of roses by invitation.

As the plants start growth early in the spring, they should be transplanted in the fall. In planting, care should be taken to have the hole large enough so that the union of the graft is two or three inches below the surface. This will encourage the young cion to make its own roots, which is very important.

A sharp watch should be kept for botrytis and wilt for, like all plants, tree peonies are subject to injury from disease and insects. At any sign of withering stems or branches, the infected parts should be cut out and burned immediately. Application of a good fungicide during the summer months will help to check this condition.

Scale is another common pest and can be controlled by spraying with a miscible oil at the rate of about one to thirty in the early spring, when the temperature is above 40°. It is preferable to do this on a bright sunny day as early as possible.

Tree peonies are reliably hardy in the Philadelphia and New York area. They have survived temperatures well below zero and are also successfully grown in upper New York state. It is reasonable to suppose they are adaptable to the climates of Michigan, Ohio and Massachusetts.

Here are some of the finest varieties of tree peonies:

Japanese hybrids: White — Gabisan, Renkaku; white with deep blotches — Shuchiuka, Fumi-no-mine, Kogane-zome; pale pink — Kintagio, Tama-fuyo; rose-pink — Akashi-gata, Hana-kurabe; rose-red — Hodei, Akashi-jishi; scarlet — Hatsu-hinode, Nissho; crimson-maroon — Hatsugarashu, Kuro-botan; purple — Rimpo, Ruriban.

Lutea Hybrids: double — Chromatella, Satin Rouge, Souvenir de Maxime Cornu, Surprise; single — Mme. Louis Henry, L'Esperance; single (of American origin) — Argosy, Banquet, Canary, Narcissus.

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BOOK REVIEWS

AMERICAN WILDLIFE AND PLANTS. Alexander C. Martin, Herbert S. Zim, and Arnold L. Nelson. 500 pages, illustrated, indexed. McGraw-Hill Book Co., Inc., New York. 1951. $7.50.

In 1932, windrows of dead eelgrass carpeted the Atlantic beaches as great beds of the plant were suddenly wiped out by disease. Simultaneously, the American brant, eighty-eight per cent of whose diet was eelgrass, began to decline. Despite protective laws, the familiar undulating lines of migrating birds shortened steadily until the sight of one brant was counted as a notable event in the bird student's year. With the disease spent, eelgrass beds again blanket the mud flats and, with their return, the brant is regaining lost ground.

The brant provides, perhaps, the most dramatic recent example of the interrelationship of plants and animals. Fortunately, most species have less specialized diets, but each has restricted food requirements upon which survival depends. Around this theme, this new book was written. A highly authoritative treatment of the feeding habits of all wildlife native to the United States, it contains three parts. The first gives interesting material on plant-animal relationships; Part II provides data on the diet of all our birds and mammals with notes on the distribution of each; Part III covers all American plants and their use to wildlife.

This unique book should prove a classic reference in its field. It provides the only complete published record of the food requirements of American birds and mammals and will have tremendous value to all who are interested, either professionally or as a hobby, in wildlife. Although the volume entailed many years of scientific research, the authors have avoided technical jargon and discussion in favor of a simple, concise treatment. It will prove as valuable to the amateur ornithologist and home owner interested in attracting songbirds to the garden as it will to professional biologists who must manage the wildlife of an entire state.

JAMES B. TREFETHEN, *Editor*
Outdoor News Bulletin
WILDLIFE MANAGEMENT INSTITUTE
Washington, D. C.

PHOTOSYNTHESIS AND RELATED PROCESSES. Volume II, Part 1. Eugene I. Rabinowitch. 1,208 pages, bibliography, index. Interscience Publishers, New York, 1951. $15.

This newest stage in Rabinowitch's herculean effort to prune the wildly luxuriant literature on photosynthesis to the tidy outlines demanded by rigorous physical and chemical theory is, like his preceding volume, an immensely valuable contribution to science. The present volume details the spectroscopy and fluorescence of photosynthetic pigments, and reaction kinetics. Critical attention is lavished on the pitfalls and achievements—one is tempted to add *mystique*—of determination of quantum yield. The author's resoluteness in reviewing these topics despite his wry admission that "The analysis of kinetic data . . . now seems somewhat like an attempt to reach a treasure chamber by drilling through steel walls while keys have been found to unlock the door" should earn the gratitude of ecologists, for the factors governing the photosynthetic efficiencies of light vs. shade-loving plants and of green plants compared with bacteria, blue-green, red, and brown algae, are treated with a most uncommon combination of lucidity, comprehensiveness, and mastery of theory. Recent results with isotopes and isolated chloroplasts are postponed to a later volume.

The author's scholarship embraces the Russian literature. One learns that in the Soviet Union studies of photosynthesis separated from other functions of the living organism are damned as "mechanistic."

The author's running commentary on the complexity of photosynthesis reveals that here is a physicist undaunted by protoplasm, yet untainted by that vice all too common in physicists attracted to biology—the impulse to over-simplify.

The book is handsome and promises to withstand hard usage and, considering its wealth of figures, tables, and formulae, reasonably priced. Errors seem few; those noticed for the most part concerned taxonomic nomenclature; the only bothersome one is a vagueness as to the distinction between the "red' (Thiorhodaceae) and "purple" (Athiorhodaceae) photosynthetic bacteria; *Chromatium* (Thiorhodaceae) is erroneously designated a purple bacterium.

S. H. HUTNER
Haskins Laboratories
New York City

FORESTS AND MEN. William B. Greeley. 255 pages, indexed. Doubleday & Co., Garden City, N. Y. 1951. $3.

The history of forestry in the United States extends back to colonial times when settlers began their struggle to build villages, homes and farms on the forested shores. But significant efforts to manage lands permanently for forest crops and services began in 1905 when the Forest Reserves were placed under the management of the Forest Service. Fortunately the events of the last half-century in forestry have recently been carefully covered in four authoritative works — three written by the first three Chief Foresters, Gifford Pinchot, Henry Graves, and William Greeley. The fourth was prepared by a group of writers under the sponsorship of the Society of American Foresters.

Greeley's is the most up to date, gives the best coverage of private forestry, and, like Pinchot's, is good reading in addition to being historically informative.

Pinchot presents forestry as the spearhead of a great conservation crusade embracing all resources. He draws sharp lines between the exploiter and the conservationist, and private profit vs. public benefits, though he displays consummate skill in enlisting support from lumbermen, other industrialists, and stockmen to get forest conservation started in a big way.

Graves concentrates on the significant problems that still lie ahead before the forests of our country can make their full contribution to national welfare.

Greeley stresses the long way we have come in the last fifty years. He points out rightly that forestry is no longer a crusade or a subject only for public concern, but a pressing economic necessity for those who would harvest and process timber, and he shows that it is good business, frequently financially profitable. The story of the "Tree Farm," "Trees for Tomorrow," "Keep America Green," and other industrial programs is vigorously told with a host of examples of applied industrial forestry. The questions of extending federal ownership, and federal regulation of private forest practice are presented and opposed. The reader cannot help but be impressed with Greeley's presentation of the magnitude of current forestry effort. The magnitude of the job still to be done is less movingly portrayed.

HARDY L. SHIRLEY
COLLEGE OF FORESTRY
Syracuse, N. Y.

WILDFLOWERS. How to Know and Enjoy Them. Samuel H. Gottscho. 192 pages, illustrated, indexed. Dodd, Mead, New York. 1951. $2.75.

In the last twenty-five years, Mr. Gottscho has become nationally known as a photographer of estates and formal gardens. Eight years ago, he visited the Fairchild Garden, now part of the Audubon Nature Center, Greenwich, Connecticut, and "fell in love with wildflowers."

His outstandingly beautiful wildflower portraits have been widely published, the series in "Woman's Day" being the best known because the pictures have been incorporated in a very attractive, useful chart.

These color pictures have been used in both editions of Mr. Gottscho's book (there is a paper-bound Pocket Book edition at 35¢), but the reproductions, unfortunately, are inferior to the originals. The book is still a good investment, however, and is worth the purchase price just for the chapter on photographing wildflowers.

There are many other fine features, including good diagnostic notes on 219 species, arranged by color and season, calendars keyed to the habitat of each flower, notes on suggested books and the use of selected wildflowers in the home, and a strong plea for wildflower conservation and the development of sanctuaries as community projects. His personal wildflower slogan is "Learn, Love and Leave for others to enjoy."

CHARLES E. MOHR, *Director*
Audubon Center
Greenwich, Conn.

PERFUME ALBUM. Jill Jessee. 160 pages, illustrations by Henry Stahlhut. Perfume Productions Press, New York. 1951. $3.50 (Spiral bound.)

In this book we are taken on an intensely interesting journey into that international realm—the world of perfume. We appreciate the research and careful detail which have contributed in making the PERFUME ALBUM such a fascinating and informative contribution to this subject. A helpful glossary of terms is appended, as well as a very excellent bibliography.

NOREEN SHERIDAN CAPEN
Bedford, N. Y.

INSECT CONTROLS BY CHEMICALS. A. W. A. Brown. 817 pages, illustrated, indexed. John Wiley & Sons, New York. 1951. $12.50.

This book should prove valuable primarily for the basic information it contains and the principles developed rather than for detailed information on the control of a specific insect. It is very comprehensive as evidenced by the list of 2,288 references cited. However, a reference is not usually listed by title, but by a short phrase indicating the subject matter to which attention is called.

All of the commonly used insecticides and acaracides, including those that have become available most recently, are discussed. The physical and chemical properties are listed and the molecular structure of each of the new organic compounds is figured and described. Also, an attempt is made to show a relationship between molecular structure and toxicity to insects. A discussion of the variations in insect morphology explains why a specific insecticide may be effective in control of a certain group of insects and ineffective against others.

The manner in which each insecticide affects insects, including the specific body structure or function involved, is discussed in some detail. Also, the effect of each material on human beings is explained.

Two chapters are devoted to the equipment used in applying insecticides. One is devoted to the hazards involved in the use of insecticides and another to the toxicity of insecticides to plants. A rather comprehensive consideration of the various groups of related insects and the insecticides that are used in controlling them follows. The final chapter deals with the effect of various chemicals on beneficial insects and wildlife, and with the resistance to insecticides that has developed in insects and mites.

R. B. NEISWANDER
Associate Entomologist
Ohio Agricultural Experiment Station

KEYS TO WOODY PLANTS. W. C. Muenscher. 108 pages, illustrated, indexed. Comstock Publishing Co., Ithaca, N. Y. 6th edition, revised, 1950. $1.25.

The reviewer first used these keys as a student in a dendrology course sometime in the later nineteen-twenties. The book, improved and brought up to date through successive editions, is still the most useful guide to the native and commoner introduced trees, shrubs, and woody vines of the northern states.

DONALD P. ROGERS

DESTRUCTIVE AND USEFUL INSECTS. C. L. Metcalf and W. P. Flint. 1,071 pages, illustrated, indexed. McGraw-Hill Book Co., New York. Third Edition 1951; revised by R. L. Metcalf. $10.

The new third edition revised by Robert L. Metcalf, son of the late C. L. Metcalf, one of the authors, represents a careful effort to bring this valuable text, recognized for many years as outstanding in the teaching of applied entomology, up to date in the fundamentals of entomology and in the control of pests.

A great amount of new material on the morphology and physiology of insects has been included with adequate documentation. Tables relating to diseases transmitted by insects to man and to plants have been modernized, and the vast array of chemical controls has been thoroughly evaluated so that the latest recommendations may be quickly compared with what was standard prior to the advent of so many new insecticides at the end of World War II. The chemistry, toxicology and formulation of the newer insecticides are discussed in a comprehensive manner and new modes of application are presented in text and illustrations.

This revision is reminiscent of the meticulous care that the original authors exerted in all their endeavors.

ERNEST N. CORY
State Entomologist
College Park, Md.

FLORA DE CUBA, Vol. II. Hermano León and Hermano Alain. 456 pages, illustrated, indexed. Colegio De La Salle, Havana, Cuba. 1951. $5.50.

Botanists everywhere have been awaiting eagerly this second volume of Brother León's Flora of Cuba. Because of his lifetime study of the prolific vegetation of his fascinating island country, no one is better qualified than he to write such an up-to-date flora. In this volume he is ably assisted by Brother Alain, who worked last summer in the herbarium of The New York Botanical Garden and plans to be here again this summer to study the Garden's historic collection of West Indian plant specimens. The present volume begins with the dicotyledons and covers 56 families from the Casuarinaceae through the Meliaceae, treating 1,190 species, subspecies, varieties, and named hybrids. There is a valuable index to vernacular names, and illustrations are scattered through the text.

H. N. MOLDENKE
Director, Trailside Museum
Watchung Reservation

ANNUAL REVIEW OF PLANT PHYSIOLOGY. Daniel I. Arnon, Editor; Leonard Machlis, Assoc. Editor. 361 pages, indexed. Annual Reviews, Inc., Stanford, Calif. Volume 2. 1951. $6.

The second volume reviews in thirteen chapters many important topics, most of which were not discussed in the first volume. The subject matter concerns the mechanism of absorption and transport of inorganic mineral nutrients and their role in nutrition; the physical background and the kinetics and chemistry of photosynthesis; biosynthesis of chlorophyll and related pigments; the Pasteur effect in respiration; the formation, occurrence, and inactivation of growth substances of the auxin group; herbicides and selective phytotoxicity; nutritional requirements of isolated plant tissues and organs; frost, drought, and heat resistance; experimental morphogenesis; gas damage to plants; and permeability.

In many cases, the authors have selected a special phase of work in a given field or have, perhaps, given undue prominence to one of several theories or concepts. For example, the first chapter deals with the absorption and movement of nutrients and the second chapter discusses the relation of mineral nutrients to enzyme systems; the chapter on respiration deals only with the Pasteur effect; and the chapter on growth substances is concerned with auxins and emphasizes the possible role of indole-acetaldehyde as an intermediate in the formation of indoleacetic acid from tryptophan. Chapters on the nutrition of isolated plant tissues and organs and on gas damage to plants represent a more general review of the respective fields. The comprehensive review of gas damage to plants includes a discussion of air pollutants of more recent interest, namely, fluorine compounds and those responsible for smog damage, and the

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A thorough revision of this standard advanced text and reference work in applied entomology. The order of presentation remains essentially the same, but many new developments and recent discoveries in insecticides have been incorporated, making this book one of the most comprehensive and up-to-date studies in the field.

DISEASES OF VEGETABLE CROPS

By JOHN C. WALKER, University of Wisconsin. *McGraw-Hill Publications in the Agricultural Sciences.* 529 pages, $7.50.

A text and reference for courses in horticulture and plant pathology, this book covers completely the known facts concerning the diseases of such vegetables as asparagus, bean, celery, onion, etc. Each disease is discussed by a consideration of symptoms, causal agents, the cycle of development, and methods of control. A list of references is included.

FLORICULTURE. Fundamentals and Practices. New 2nd edition.

By ALEX LAURIE and VICTOR H. RIES, Ohio State University. *McGraw-Hill Publications in the Agricultural Sciences.* 524 pages, $6.00.

Revised in order to bring the material up to date in line with recent advances and techniques, this text includes new material on pest control, the application of water, measurement of soil moisture, and aids to better growth.

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cited literature is classified according to the type of toxicant.

Two chapters on photosynthesis emphasize the value of tracer elements in studies of intermediate reactions leading to the formation of sucrose, but at the same time attention is called to the complex nature of tracer methods, particularly those involving isotope discrimination.

This Annual Review of Plant Physiology (1951) constitutes a valuable source of information for the particular phases of work discussed, and contains an impressive list of cited literature at the end of each chapter.

A. E. HITCHCOCK
Boyce Thompson Institute

A MONOGRAPH OF CLAVARIA AND ALLIED GENERA. E. J. H. Corner. 740 pages, illustrations, bibliography, index. 16 color plates. Oxford University Press, New York. 1950. $21.

The aim of Corner's work is to include keys and descriptions for all known and recognizable species of the Clavariaceae (coral fungi). Since species of fungi are much less limited to a given area — even a continent — than are most green plants, a world monograph such as this is of the greatest importance to students of the group. Because much of the author's field experience was gained in the tropics, where fleshy fungi are in general imperfectly known, his book is an especially valuable contribution to botanical literature. It is quite indispensable for anyone undertaking a technical study of the clavarias.

The old genus *Clavaria* is clearly a taxonomic monstrosity; and the author, recognizing this, has divided it into a number of genera. His introductory discussion of the morphology and manner of development of the clavarioid fruiting-body offers the results in a new family of a type of investigation in which the author has long been an unrivaled master. In delimiting genera on the basis of his hyphal analysis he seems, unfortunately, to have overlooked the Linnaean (and Friesian) maxim that "the genus shall give the character, not the character the genus"— that is, to have decided *a priori* that a given combination of characters necessitates the recognition of a distinct genus, rather than seeking for the distinguishing traits by which may be recognized a manifestly related group of species. This procedure, together with a sometimes arbitrary nomenclature, prevents what is unquestionably a great work from being also a definitive one.

DONALD P. ROGERS

SEAWEEDS AND THEIR USES. V. J. Chapman. 287 pages, illustrations, bibliography, index; with 20 halftone plates. British Book Centre, Inc., New York City. 1950. $6.25. (Printed in Great Britain.)

Professor Chapman has given a very readable account of the uses of seaweeds, those plants of the sea so familiar to beach dwellers over the world.

A short historical account makes us aware of the fact that except for certain highly specific industrial uses of the by-products of certain seaweeds, we use very little more of them today than did the early Chinese. Indeed, the widespread use in the last centuries of seaweeds as manure in coastal regions of the British Isles and France has been all but abandoned. Yet these plants offer a ready and inexpensive source of potassium and phosphates, and the organic nature of their fleshy "stems and leaves" furnishes water-retention properties so desirable in sandy and clay-like soils.

The two main groups of seaweeds which furnish industrial products are the large brown algae, the kelps, and certain red algae from which agar is extracted. The kelps had their reign during World War I when they were used for their iodine and potassium contents, but when the need for the latter in particular subsided, the industry died out. A nearly similar picture might be portrayed for the American manufacture of agar, with World War II as the setting, were it not for the wide and successful use in medicine of antibiotics, whose parent molds must use agar as a medium for growth. Previous to World War II, the bulk of the agar used in the United States — mainly for bacteriological media — was imported from Japan. When this source was cut, a revival of a nearly unknown small West Coast company furnished the necessary agar to the country. There are now several companies in California and Mexico extracting agar, but they are plagued by labor problems, involving chiefly the collection of the necessary seaweeds. Imports of Japanese-prepared agar supplement the total quantity needed in the country. On the West Coast, it is hoped that certain methods can be worked out whereby fishermen after the elusive sardine, faced with competitive prices of tuna, might supplement their incomes with seaweed collecting.

A kelp industry has been revived for the extraction of alginic acid, widely used in certain food preparations and methods (e.g., as stabilizers and homogenizers). The uses of algin have by no means been fully explored, and from its wide current use in textiles, paint materials, food, and medicine, the possibilities of its further uses seem almost limitless.

In Mr. Chapman's references to the seaweed industries, he cites incorrectly in a footnote, and omits entirely in the bibliography, the source book of American workers: U. S. Senate Document No. 190, published in 1911 and issued in 1912. This volume is titled "Fertilizer Resources of the United States" and contains excellent and detailed material on the kelps of the U. S.

Although of small commercial value, seaweeds as food constitute two interesting chapters in Prof. Chapman's book. It is quite remarkable that so many different peoples use many of the same seaweeds as food in a variety of ways. In the opinion of the reviewer, Mr. Chapman appears unsympathetic to some of the eating habits of some of these peoples. As a native Hawaiian, the reviewer looks upon seaweeds in the menu as a definite "treat" and not as an indication of a lower standard of living. I have not met a Japanese who did not think of seaweed as food with a glow of anticipation. Perhaps the author's closer association with the Maoris of New Zealand will have changed his views in this regard, between preparation of the manuscript and the present time.

The line drawings in this book are good and the reproductions of Japanese prints a definite contribution; it is to be regretted that more good photographs of these extremely photogenic plants were not included. The book would have been more attractive for them.

ISABELLA ABBOTT
Hopkins Marine Station of Stanford University
Pacific Grove, Calif.

ILLUSTRATED FLORA OF THE PACIFIC STATES. Vol. III, Geraniums to Figworts. Leroy Abrams. 866 pages, illustrated, indexed. Stanford University Press, Stanford, Calif. 1951. $17.50.

This volume, which actually extends through the Figworts, is the largest of the three so far published and has the same format and beautiful illustrations as Volume II.

As in Volume I, several of the larger families are treated by specialists, slightly over half the text being contributed by such taxonomists as R. S. Ferris, P. A. Munz, H. L. Mason, Lincoln Constance, and F. W. Pennell. In general, however, the same rather conservative concept of generic and specific entities is followed, the contributing authors using either varietal or subspecific categories according to their preference, but without corresponding keys. In some instances where large species are thus subdivided, it is difficult to carry identification below the specific level.

The general excellence of this volume makes one hope that it will be but a short time until Dr. Abrams is able to complete his tremendous enterprise with the publication of Volume IV.

C. L. HITCHCOCK
Dept. of Botany
University of Washington

(Continued on page 94)

NEWS, NOTES and COMMENTS

International Flower Show. The 36th International Flower Show did credit to its sponsors, the Horticultural Society of New York and the New York Florists' Club, and the many organizations, commercial concerns, and private individuals who participated in it. It was generally conceded that the plant material was of better quality than that of the past several years and that the gardens were "less spectacular, more down to earth," and thus afforded Mr. Average Citizen better opportunity to obtain practical ideas on the development of his own home property. The delightful spring garden display by Donald A. MacDonald, the beautiful rose gardens created by Bobbink & Atkins and Don Roehrs, the tulip border by Mrs. Flagler Matthews, could be duplicated entirely or in part by the home owner. In all probability he would not succeed in producing the superb tulips — large blooms on erect, stiff stems — that were seen in Mrs. Matthews' tulip border, for they reflected the cultural skill of a top-notch professional gardener, James Jack, who is in charge of Mrs. Matthews' estate. However, the home gardener could grow the tulips, roses, iris, tuberous begonias, geraniums, and other flowers seen in the various gardens — and could get good blooms in proportion to the time and care he was willing to spend on them.

Certainly he could grow much better geraniums than he may have been growing, if he followed the advice which The New York Botanical Garden made available to him through its very fine geranium exhibit. It was "A Geranium Collector's Garden" and, watching the crowd that gathered there, one found it difficult to determine whether the public was more interested in the many new and unusual varieties or in the propagating demonstration arranged for its benefit in the lean-to greenhouse.

The Brooklyn Botanic Garden had a pleasing educational exhibit — a "Time-budget Garden," and the "Planting in the Shade" by the National Association of Gardeners also drew favorable comment. It was another exhibit that contributed usable information to the home owner. The inclusion of well-flowered *Shortia galacifolia* merits special mention. The Garden Club of America, in presenting "The World Is Our Garden," emphasizing the geographical origin of plants, did a magnificent piece of work that entailed considerable research. The naturalistic planting of ericaceous material was one of the most interesting exhibits at the International Flower Show, and the demonstration by the Conservation Committee of the Garden Club of America of terracing and mulching was also informative and helpful. The Federated Garden Clubs of New York staged attractive displays of herbs and simples and their flower arrangements throughout the show were uniformly good. The invitation arrangements by members of the Horticultural Society of New York included some that were particularly outstanding in the use and choice of plant material.

Lumite Shade Cloth Aids Orchid Growth. Experiments conducted by Dr. O. Wesley Davidson, professor of ornamental horticulture at Rutgers University, New Brunswick, N. J., indicate that the use of Lumite shade cloth has contributed to a 300% increase in the number of fertilized orchids grown during his tests. Dr. Davidson has been experimenting for the past two years with a combination of factors controlling light, heat, humidity and fertilizer in orchid growing — for orchids are a three and a half million dollar business in New Jersey.

As part of the experiment in light control, Lumite shade cloth was placed on the roof of the college greenhouse two years ago in place of a lath shade made of hard-grained cypress. This Lumite shade cloth, measuring approximately twenty-five feet long by thirty-three feet wide, is rolled on an aluminum pipe which is mounted on an aluminum frame. This cloth can be rolled up and down to control the light during the day. When rolled down, the mesh eliminates approximately 55% of the light intensity.

"Fertilized orchids can use more light than unfertilized, and Lumite shade cloth permits the plants to get the necessary light without burning," quotes Dr. Davidson. "Started from small plants, these orchids grew quicker, with better texture and stronger stems and therefore lasted longer. Some orchids can now be flowered in three and a half to four years, instead of five to seven years, because of combined light and nutrient."

Organic Materials and Their Importance in Soil Building. A recent meeting on this subject was sponsored by Hyper-Humus Company of Newton, N. J., at which Dr. Firman E. Bear, Chairman of the Soils Department of Rutgers University, was the principal speaker. To quote very briefly from Dr. Bear's interesting talk on the basic value of organic matter:

"Peat (also called 'muck') is made up largely of decomposed plants which once grew in shallow lakes and accumulated as they died and fell into the water. The organic matter content of completely dry native peats varies from 50 to 90 per cent, depending on the amounts of silt, sand, and clay which they contain. Peats have a high capacity for holding water. A ton of moist peat from a well-drained peat bog will usually contain from 300 to 600 pounds of actual organic matter, in comparison with about 500 pounds of actual organic matter in a ton of dairy barn manure. Native peat from peat bogs and swamps of New Jersey is very rich in humus.

"The organic matter in peat is in a much more advanced stage of decomposition than is that in manure, and hence it is more inert when added to the soil. For this reason, peat should be thoroughly mixed through the plow zone to produce the best results. Ordinary harrowing and discing do not give as good a distribution of peat in the soil as does the use of a rotary tilling machine such as is employed in landscaping and nursery work. The goal in the incorporation of peat is to produce a humus coating around every soil granule, to simulate the natural occurrence of humus in the soil.

"When thoroughly incorporated with the soil, peat is valuable for increasing the growth of grass for lawns and golf courses, and for stimulating growth of ryegrass used as a winter cover crop. It is also used very successfully for the preparation of compost for topdressing golf greens and similar areas. Peat has also proved to be a satisfactory type of organic matter for use on plant beds. Further research is needed before recommendations can be made on the best methods of using peat as a source of organic matter for growing cultivated crops."

Dr. Bear offered a valuable suggestion to the fertilizer industry when he said, "Instead of looking with a jaundiced eye at the efforts of the organic-farming enthusiasts to develop organic-matter supplies for use on the soil, the fertilizer industry would do

"A Geranium Collector's Garden" was The New York Botanical Garden's exhibit at the International Flower Show.

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well to interest itself in this problem. There is need for study of the possibilities for recovery of city wastes. But the real opportunity lies in the development of long-range grass-legume sod and cover-crop programs."

Research is being undertaken at Rutgers University on the use of waste material as soil builders — this has been made possible through an $18,000 scholarship presented by Walker-Gordon Company of Plainsboro, New Jersey.

Garden Club of New Jersey. The Garden Club of New Jersey received an achievement award at the 23rd annual meeting of the National Council of State Garden Clubs, for its Cornus Arboretum in Plainfield, N. J., and for the Green Thumb Corps of Gardening Therapy at Lyons Veteran Hospital. The Cornus Arboretum, started by the Plainfield Garden Club twenty years ago in Cedar Brook Park, has forty different kinds of dogwood. The Green Thumb Corps of Gardening Therapy was started at Lyons Veteran Hospital in the Fall of 1950, to train women to garden directly with the mental patients out-of-doors during the summer and in the greenhouse in bad weather. The value of gardening therapy for mental patients has long been recognized, and the program will be enlarged and extended to other VA hospitals.

The Garden Club of New Jersey cooperated with the All-Jersey Florists in a Flower Show at Kresge's Department Store, Newark, N. J., March 10 to 13. Kresge placed at the club's disposal ten room settings on the fifth floor of its store, each room being decorated with suitable flower arrangements. Twenty clubs and six individuals competed. On the eighth floor florists staged exhibits and the Garden Club of New Jersey showed horticultural classes.

Garden Club of America's Founders' Award. The Garden Club of America, in its 39th annual meeting, held in Santa Barbara, California, on April 3, presented its coveted Founders' Fund Award to support The New York Botanical Garden's horticultural expedition to England and Ireland. The expedition will be undertaken this summer under the direction of T. H. Everett, Horticulturist of the Garden.

Garden Tours. The gardens to be visited on May 27 in the Garden Tour sponsored by the Advisory Council of The New York Botanical Garden are those of Mrs. John Parsons, Rye, New York; Mrs. Flagler Matthews, Rye, New York; Mrs. Carl Tucker, Mt. Kisco, New York, and Mrs. Arthur Anderson, Bedford Hills, New York. Further information may be had from The New York Botanical Garden, 801 Madison Avenue, New York, N. Y.

Credit to Our Library. May-June, 1951, issue of The Garden Journal of The New York Botanical Garden carried the address of Clyde Eddy at the dedication of a memorial plaque in honor of John Clayton, early American botanist. In a letter which Mr. Eddy recently sent to Miss Elizabeth Hall, Librarian, he states, "As a result of the work done by Miss Georgien Mogford and Miss Jessie Hopkins of Cardinal, Virginia, the State of Virginia has erected a marker for John Clayton.

"Miss Mogford and the members of her committee are trying to raise funds to build a more elaborate marker at the farm where John Clayton had his gardens. You may also be interested to learn that a recently organized garden club in Mathews County is called the John Clayton Garden Club.

"All of us in Mathews County who are interested in John Clayton thank you again for your cooperation in making a success of the efforts being carried forward to secure adequate recognition of Clayton."

Flower Arrangement Photograph Competition. This competition is being sponsored by Floral Art, 405 Cedar Lane, Teaneck, N. J. An award will be made for the photograph of the best flower arrangement stressing simplicity and design. Only black and white glossy prints, 8 x 10", may be entered. The contest closes July 1, 1952.

"Alice in Wonderland." For the special Easter show at The New York Botanical Garden Alice was on hand in her blue gown and white pinafore to greet the children, and live animals kept her company. Walt Disney cutouts of the Mad Hatter, the Cheshire Cat, the March Hare and the Playing Garden Gardeners furnished amusing decorations. Flowers in Alice's Wonderland Garden included Easter lilies, primroses, cyclamen, cinerarias, hydrangeas and wall flowers.

Mrs. F. Leonard Kellogg. Mrs. Kellogg, who served as a member of the Advisory Council since February 20, 1931, and as a member of the Corporation since January 9, 1933, died February 13, 1952. Mrs. Kellogg was treasurer of the Advisory Council from 1931 to 1948.

BOOK REVIEWS **(from page 92)**

NATURE'S WAYS. Roy Chapman Andrews. 206 pages, illustrated, indexed. Crown Publishers, New York. 1951. $3.75.

There could be no better introduction to this unique book than the quotation from Montaigne which is under the first illustration. "Let us a little permit nature to take her own ways: she better understands her own affairs than we."

If you have ever been confounded by the unending questions of children, you will welcome this book. But it is not a book for children only, for the information presented in simple English, is of intense interest to those who daily marvel at nature's ways. As an example, take the following intriguing titles, "The Inventor of the 'Blackout' and Jet Propulsion," an explanation of the clever devices the octopus uses to bewilder his enemies. Or, "The Fish with the Anti-Aircraft Gun." This is the archer fish that shoots insects on plants high above him by water flak.

The book is profusely illustrated in color and by half-tones. The color plates are decorative, not realistic in one sense, but highly dramatic and compelling immediate attention. Many of the half-tones are from photographs of habitat groups at the American Museum of Natural History. Although these groups are admirably presented, it seems as if the author with his wide knowledge and connections might have secured more photographs from the wild.

MARGARET MCKENNY
Olympia, Wash.

THE PROPAGATION OF ALPINES. Lawrence D. Hills. 464 pages, illustrated (line drawings by Maurice Wilson), indexed. Pellegrini & Cudahy, New York. 1951. $5.

A first-hand report on the experience of four skilled propagators, this book offers an exhaustive study of the most modern methods of propagation of herbaceous mate-

(Continued on page 96)

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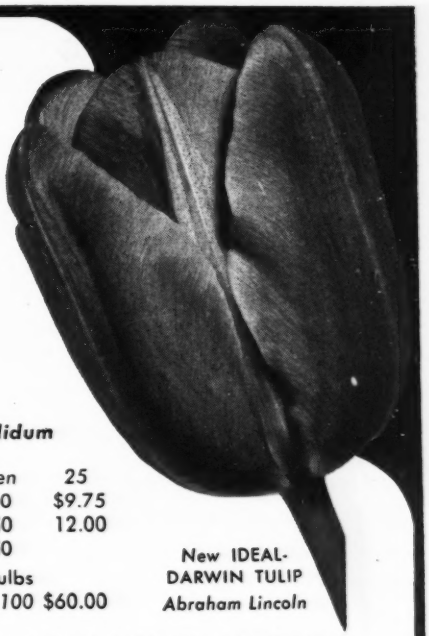

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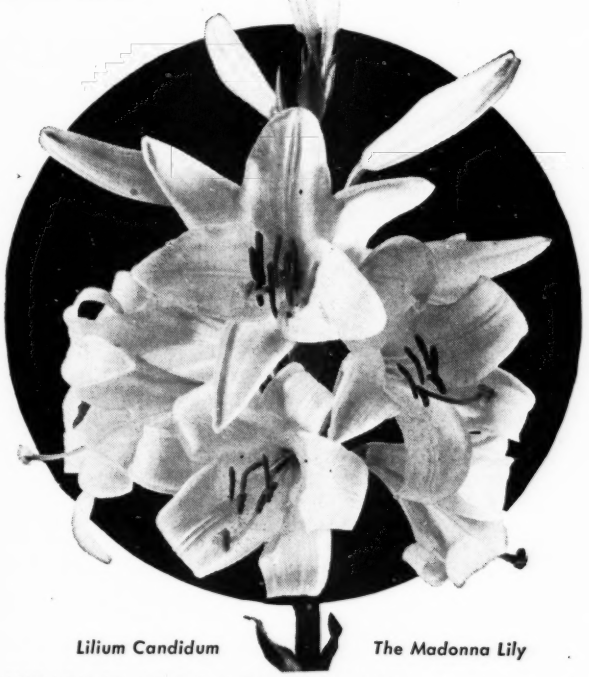

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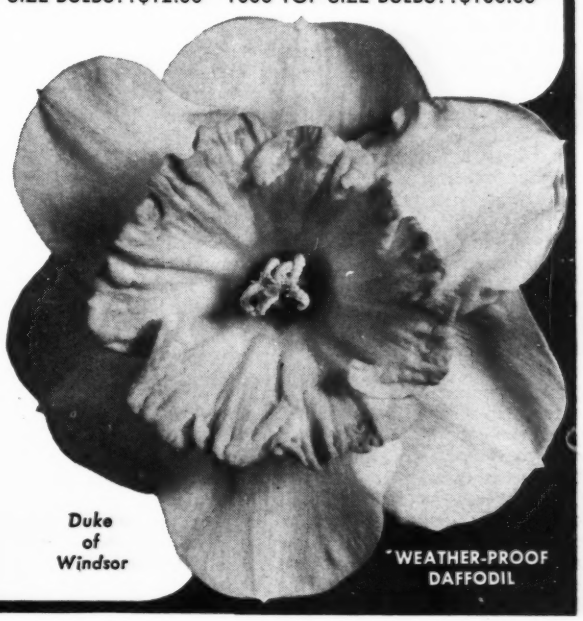

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rial and of many woody plants, as well as true alpines. Detailed information is given for every step from seed-sowing and making of divisions and all types of cuttings, to growing on the plants until ready for market or for the garden. Potting soils are discussed at length, as are seed saving and storage, rooting hormones, and the use of sphagnum and vermiculite.

The bulk of the book is devoted to four sections in which, species by species, instructions are given for propagation by division, cuttings, and seed, and in the final part, advice is given for those plants which need special attention. In all about 2,500 species are considered individually; many of these are virtually unknown, and a few probably ungrowable, in this country, while a few are omitted about which detailed advice would be most welcome. This is, however, a minor fault, and the author admits that he is in quest of further information.

The style is interesting, and the comments on individual species often go far beyond the necessary technical information. Any amateur interested in propagation will find the book invaluable; and the expert, although he may occasionally disagree on a minor point, cannot fail to learn much from the tremendous mass of data offered.

C. R. WORTH
Groton, N. Y.

ALKALI SOILS. W. P. Kelley. 176 pages, bibliography, index. Reinhold, New York. 1951. $5.

This monograph is a logical presentation of the various characteristics of alkali soils. The first part deals with the origin and effect of salts in soils, the relation of soluble salts to exchangeable bases and the formation of sodium carbonate and the development of alkali soils. The theoretical aspects of alkali soils are extremely well presented and emphasize the value of exchange reactions as an important part of soil research.

The last three chapters of this book have to do with the practical application of these studies on problems related to the irrigation of alkali soils, the relationships of salts to plant growth and the general reclamation of alkali soils. This part demonstrates the value of theoretical studies to the solution of practical soil problems. As the author points out, about one third of the surface of the earth is arid or semi-arid and the economical utilization of soils in these regions is of utmost importance.

The author has been highly successful in presenting this subject in a logical, concise and stimulating fashion, not only for the soil scientist but for the farmer and those interested in developing areas where alkali soils occur. The utilization of arid and semi-arid soils in the future will be materially assisted by careful study of the works of the author and others which have been presented in this book. The references are unusually complete and should be useful for consultation as regards details. The book is an example of careful, critical and thorough soil research at its best.

C. D. JEFFRIES
Professor of Soil Technology
Pennsylvania State College

PIONEER AMERICAN GARDENING. Compiled by Elvenia Slosson. 306 pages with 28 photographs as illustrations; bibliography. Coward-McCann, Inc., New York. 1951. $3.75.

This book illustrates how much can be accomplished when widely separated groups are engaged in a common project. At the request of Elvenia Slosson, during her term of office as president of the National Council of State Garden Clubs, club members and well-known authorities contributed stories giving glimpses of the development of horticulture in this country since the time of the early settlers. Assembled into book form by Mrs. Slosson, the stories provide a unique record of historical events and traditions as seen through the eyes of gardeners and flower lovers throughout the United States. They give an insight into the vital part played by the pioneer women as well as by famous plantsmen in creating the first gardens in the New World and trace their influence upon our "national garden" as we know it today.

The stories are grouped under seven headings, the names of the National Council Regions into which the contributing states are organized. The states thus grouped together have similar growing conditions and their interdependence is made very evident.

The book is an appreciation of the cultural background afforded us by our flower-loving ancestors.

KATHRYN S. TAYLOR
Dover, Mass.

CHARLESTON GARDENS. Loutrel W. Briggs. 156 pages, photographs by R. Adamson Brown and others; bibliography. University of South Carolina Press, Columbia, S. C. 1951. $7.50.

Here we have a record of the fabulous Charleston gardens, old and new, large and small, that is substantiated by maps and plans, and illustrated with a beautiful collection of photographs.

By virtue of his training as a landscape architect, Loutrel W. Briggs is well qualified to present these plans and specifications with accuracy; the charm of the gardens is projected as only an "adopted native son" could do.

The book will be of value to landscape designers and horticulturists, to historians and to any one who loves gardens and enjoys reading about them. It has been almost two years since I last visited the Charleston gardens, but I am mentally transported to this beautiful Low Country every time I open the pages of this fascinating book.

CAMILLA BRADLEY, *Editor*
Home Gardening for the South

from the HERB SHELF

FRESH-WATER BASS BROILED WITH HERBS

¼ lb. butter
2 tbs. minced fresh parsley
½ tsp. minced fresh rosemary *or*
¼ tsp. crushed dried rosemary
2 tbs. lemon juice
½ tsp. salt
¼ tsp. freshly ground pepper
water cress

All firm, flaky, sweet-meated, fresh-water fish are deliciously piquant when prepared with rosemary and parsley. Allow ½ lb. dressed fish for each serving.

Have the fresh-water bass pan-dressed, the center bone removed, the fish split open but not filleted.

Melt butter in shallow pan over *low* flame; in separate bowl, blend well parsley, rosemary, lemon juice, salt and pepper. Add blended herbs to melted butter and stir well. Brush fish generously with herbed-butter.

Preheat broiling compartment to 500°F.; place fish skin-side down on broiler rack 3 inches below flame; broil 5 minutes; brush with herbed-butter; broil 5 minutes more or until golden brown; pour balance of herbed-butter over fish.

Arrange fish on preheated hot platter. Garnish with water cress. Serve piping hot on preheated plates. (¼ lb. herbed-butter is sufficient for 4-6 servings.)

MILO MILORADOVICH

Parsley, *Petroselinum hortense,* is easily grown from seed. Early sowing is advised, in a hotbed or coldframe, or in the open ground as soon as it seems practicable in the Spring. Seeds should be sown thinly in shallow drills and plants should be grown 4 to 8 inches apart. Parsley is cultivated in the same manner as carrots.

Gather the parsley leaves as needed. Parsley seems to bear better if you collect a few leaves from different plants at one time rather than removing the entire crown from one.

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Publications of THE NEW YORK BOTANICAL GARDEN

Books, Booklets, and Special Numbers of the Journal

Flora of the Prairies, and Plains of Central North America, by P. A. Rydberg. 969 pages and 601 figures. 1932. $6.

Plants of the Vicinity of New York. by H. A. Gleason. 284 pages, illustrated. A handbook especially compiled for the beginner. 1935. Second edition 1947. $2.

The Bahama Flora. by Nathaniel Lord Britton and Charles Frederick Millspaugh. 695 pages. Descriptions of the spermatophytes, pteridophytes, bryophytes, and thallophytes of the Bahamas, with keys, notes on explorations and collections, bibliography, and index. 1920. $6.25.

North American Cariceae, by Kenneth K. Mackenzie, containing 539 plates of *Carex and* related plants by Harry C. Creutzburg, with a description of each species. Indexed. 1940. Two volumes, 10¾ x 13½ inches; bound $17.50. Foreign postage extra.

Keys to the North American Species of Carex, by K. K. Mackenzie. From Vol. 19, Part 1, of *North American Flora.* $1.25.

Plants of the Holy Scriptures, by Eleanor King, with a check-list of plants that are mentioned in the Bible, each one accompanied by a quotation. Revised from the Journal of March 1941. 23 pages, illustrated. 1948. 25 cents.

Food and Drug Plants of the North American Indian. Two illustrated articles by Marian A. & G. L. Wittrock in the Journal for March 1942. 15 cents.

Vegetables and Fruits for the Home Garden. Four authoritative articles reprinted from the Journal, 21 pages, illustrated, Edited by Carol H. Woodward. 1941. 15 cents.

The Flora of the Unicorn Tapestries, by E. J. Alexander and Carol H. Woodward. 28 pages, illustrated with photographs and drawings; bound with paper. 1941. Second Edition 1947. Third Edition 1950. 25 cents.

Catalog of Hardy Trees and Shrubs. A list of the woody plants being grown outdoors at The New York Botanical Garden in 1942, in 127 pages with notes, a map, and 20 illustrations. 75 cents.

Succulent Plants of New and Old World Deserts, by E. J. Alexander. 64 pages, indexed. 350 species treated, 100 illustrated. Bound in paper. 1942. Second edition 1944. Third edition 1950. 50 cents.

Review of Juniperus chinensis, et al, by P. J. van Melle. A study of the many varieties and forms of *Juniperus* which have been commonly included in the concept of *J. chinensis.* 108 pages, illustrated, bound in paper. 1947. $2.

Periodicals

The Garden Journal of The New York Botanical Garden, bimonthly, designed to stimulate interest in the world of plants and the science of plant life, contains non-technical articles on botanical, horticultural and kindred subjects: also special departments — book reviews, questions and answers, news and comments. $2.00 a year, 35c single copy. Foreign subscription $2.50 a year.

Addisonia, devoted exclusively to colored plates accompanied by popular descriptions of flowering plants; eight plates in each number, thirty-two in each volume. Now in its twenty-second volume. Published irregularly. Subscription price, $10 a volume. Not offered in exchange. Free to members of the Garden.

Mycologia, bimonthly, illustrated in color and otherwise; devoted to fungi, including lichens, containing technical articles and news and notes of general interest. $7 a year; single copies $1.50 each. Now in its forty-third volume.

Brittonia. A series of botanical papers published in cooperation with the American Society of Plant Taxonomists. Subscription price of volumes 1 through 5, $5 a volume ($4 to members of the Society). Now in its seventh volume. Price, $7.50 ($5 to members of the Society).

North American Flora. Descriptions of the wild plants of North America, including Greenland, the West Indies, and Central America. 100 parts now issued. Not offered in exchange. Prices of the separate parts on request.

Contributions from The New York Botanical Garden. A series of technical papers reprinted from journals other than the above, 1899-1933. 25 cents each, $5 a volume. List of separate titles on request.

Memoirs of The New York Botanical Garden. A collection of scientific papers, issued irregularly. 1900——. Vols. 1-6, to members of the Garden, $1.50 a volume; to others, $3.00. Vol. 7, to members, $2.50; to others, $5.00. Vol. 8, $10.00.

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